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THESIS

ELECTRONIC WARFARE: A CRITICAL MILITARY AND TECHNOLOGICAL ASSET FOR THE IMPROVEMENT OF THE COMMON EUROPEAN SECURITY AND DEFENSE POLICY (ESDP)

by

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September 2004

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13. ABSTRACT (maximum 200 words)

        Since the Maastricht Treaty, the European Union (EU) operates under three key pillars. The second pillar, known as the Common Foreign and Security Policy (CFSP), introduced the need among Member States to develop a common European Security and Defense Policy (ESDP). Aimed at providing police and military capabilities to the CFSP, this idea represented a new important element in the European integration progress. ESDP was launched formally in June 1999, establishing ESDP's mission roots on what it is known as the three "Petersberg Tasks," (1) Humanitarian and Evacuation Missions, (2) Peace Keeping Missions, and (3) Combat Missions for Crisis Management. The aim of EU was to upgrade its role and influence in the international arena, with no intention of overcoming NATO's role and capabilities in the field of collective defense. The purpose of this thesis is to demonstrate the perspectives for the development of the European Security and Defense Policy and to stress the need to consider Electronic Warfare a critical asset in the military and technological capability options. The need for common operational concepts, doctrines and training, especially in the field of EW, becomes a necessity as Joint EU Armed Forces report active and ready to manage regional and international crisis. However, the study of ESDP's current status shows that EW, an important military component, has been addressed but not emphasized properly. In order to demonstrate EW's "weight", an imaginary scenario, under the name "Save Atlantia 2008", has been created in which an advance software program, (i.e., IMOM model), simulates EW effects. The Improved Many-on-Many (IMOM) computer software, presently used by the U.S. Air Force to model the Electronic Order of Battle (EOB), will be used to model the Radar and Tactical Jamming System and conclusions will be based on the theoretical expected jamming effectiveness of the Joint European Air Force against several radar systems in the imaginary scenario.

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ELECTRONIC WARFARE: A CRITICAL MILITARY AND TECHNOLOGICAL ASSET FOR THE IMPROVEMENT OF THE COMMON EUROPEAN SECURITY AND DEFENSE POLICY (ESDP)

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ABSTRACT

Since the Maastricht Treaty, the European Union (EU) operates under three key pillars. The second pillar, known as the Common Foreign and Security Policy (CFSP), introduced the need among Member States to develop a common European Security and Defense Policy (ESDP). Aimed at providing police and military capabilities to the CFSP, this idea represented a new important element in the European integration progress. ESDP was launched formally in June 1999, establishing ESDP's mission roots on what it is known as the three "Petersberg Tasks," (1) Humanitarian and Evacuation Missions, (2) Peace Keeping Missions, and (3) Combat Missions for Crisis Management. The aim of EU was to upgrade its role and influence in the international arena, with no intention of overcoming NATO's role and capabilities in the field of collective defense. The purpose of this thesis is to demonstrate the perspectives for the development of the European Security and Defense Policy and to stress the need to consider Electronic Warfare a critical asset in the military and technological capability options. The need for common operational concepts, doctrines and training, especially in the field of EW, becomes a necessity as Joint EU Armed Forces report active and ready to manage regional and international crisis. However, the study of ESDP's current status shows that EW, an important military component, has been addressed but not emphasized properly. In order to demonstrate EW's "weight", an imaginary scenario, under the name "Save Atlantia 2008", has been created in which an advance software program, (i.e., IMOM model), simulates EW effects. The Improved Many-on-Many (IMOM) computer software, presently used by the U.S. Air Force to model the Electronic Order of Battle (EOB), will be used to model the Radar and Tactical Jamming System and conclusions will be based on the theoretical expected jamming effectiveness of the Joint European Air Force against several radar systems in the imaginary scenario.

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ABBREVIATIONS AND ACRONYMS LIST

AAA: Anti Aircraft Artilleries
AAR: Air to Air Refueling
ACP: Air Campaign Planners
AEW: Airborne Early Warning
AFIWC: Air Force Information Warfare Center
AGL: Above Ground Level
AGS: Air Ground Surveillance
AOI: Area of Interest
ATO: Air Tasking Order
Avg: Average

C2:   Command and Control
C3I: Command, Control, Communication and Intelligence
C4ISR: Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance
CAOC: Combined Air Operation Center
CAP: Crisis Action Planning
CFSP: Common Foreign and Security Policy
CIMIC: Civil Military Cooperation
CIS: Combat Intelligence System
CIS: Command and Information Systems
CIWS: Close In Weapons Systems
CME: Crisis Management Exercise
COA: Course of Action
CPCO: Centre de planification et de Conduite des Operations
CSAR: Combat Search and Rescue
CTAPS: Contingency Theater Automated Planning System
CW: Continuous Wave

DoD: Department of Defense
DRC: Democratic Republic of Congo
DTED: Digital Terrain Elevation Data

EA: Electronic Attack
EAC: European Airlift Command
EACC: European Airlift Command and Control
EAEC: European Atomic Energy Community
EC: Electronic Combat
EC: European Community

ECAP:	European Capability Action Plan
ECCM:	Electronic Counter-Counter Measures
ECM:	Electronic Countermeasures
ECSC:	European Coal and Steel Community
EDA:	European Defense Agency
EDC:	European Defense Community
EDF:	European Development Fund
EEC:	European Economic Community
ELNOT:	Electronic Intelligence Notation
EM:	Electromagnetic
EMS:	European Monetary System
EMU:	Economic and Monetary Union
EOB:	Electronic Order of Battle
EP:	Electronic Protection
EPC:	European Political Cooperation
ES:	Electronic Support
ESDI:	European Security and Defense Identity
ESDP:	European Security and Defense Policy
ESM:	Electronic Support Measures
EU:	European Union
EUMC:	European Union Military Committee
EUMS:	European Union Military Staff
EUPOL:	EU Police Operation
EW:	Early Warning
EW:	Electronic Warfare
EWOD:	Electronic Warfare Operations Directorate
EWPD:	Electronic Warfare Plans Directorate
EWS:	Electronic Warfare Squadron

FC:	Fire Control
FSTA:	Future Strategic Tanker Aircraft
FT:	Feet
FYROM:	Yugoslav Republic of Macedonia

HF:	Height Finder
HFC:	Helsinki Force Catalogue
HG:	Headline Goal
HHC:	Helsinki Headline goal Catalogue
HHG:	Helsinki Headline Goals
HQ:	Head Quarters
HR:	High Representative

IFOR:	Implementation Force
IMOM:	Improved Many (Radars) on Many (Jammers)

INEEL:	Idaho National Engineering & Environmental Laboratory
IO:	Information Operations
IP:	Initial Point
IPTF:	International Police Task Force
ISAF:	International Security Assistance Force
ISTAR:	Intelligence, Surveillance, Target Acquisition and Reconnaissance
JFACC:	Joint Forces Air Component Commander
LGB:	Lazer Guided Bomb
LOC:	Lines Of Communication
LOS:	Line Of Sight
LOS:	Lines Of Supply
MCM:	Mine Counter Measures
MD:	Model Description
MI:	Military Intelligence
MSL:	Mean Sea Level
NAI:	Name Area of Interest
NATO:	North Atlantic Treaty Organization
NBC:	Nuclear, Biological and Chemical
NEWAC:	NATO Electronic Warfare Advisory Committee
NIMA:	National Imagery and Mapping Agency
NRF:	NATO Reaction Force
OB:	Order of Battle
OSCE:	Organization for Security and Co-operation in Europe
Pd:	Probability of Detection
Pfa:	Probability False Alarm
PFPS:	Personal Flight Planning Software
PG:	Project Group
POL:	Petroleum, Oil, Lubrication
PSC:	Political Security Committee
RCS:	Radar Cross Section
S/N:	Signal to Noise ratio
SACEUR:	Supreme Allied Commander Europe
SAL:	Strategic Air Lift

SAM: Surface to Air Missile
SEA: Single European Act
SEAD: Suppression of Enemy Air Defense
SFOR: Stabilization Force
SHAPE: Supreme Headquarter Allied Powers
SHORAD: Short Range Air Defense
SIAF: Spanish Italian Amphibious Force
SOJ: Stand of Jamming
SPJ: Self Protection Jamming
SSL: Strategic Sea Lift

TA: Target Acquisition
TBMCS: Theater Battle Management Combat System
TBMD: Theater Ballistic Missile Defense
TOT: Time On Target
TT: Target Track

UAV: Unmanned Aerial Vehicle
UK: United Kingdom
UN: United Nations
UNSC: UN Security Council
US: United States

WEU: Western European Union
WGS: World Geodetic System

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I.   INTRODUCTION

A.   BACKGROUND

Europe faced a new era after the Second World War (WWII). The need, among Europeans, to establish a common economic, social and military path became visible during the early 1950s. Fifty three years later, the Maastricht Treaty, renamed the European Community (EC), originally formed in 1958, to European Union (EU) and shaped what is known as EU's three pillars. *The first pillar*, European Community, combined all the existing treaties and supported the European Monetary Union[1]. *The second pillar*, Common Foreign and Security Policy (CFSP), promoted cooperation among member states in foreign policy affairs and *the third pillar*, Cooperation in Justice and Home Affairs, dealt with common European views relative to these issues[2]. However, the second pillar introduced also the need to develop a common European Security and Defense Policy (ESDP). Aimed at providing police and military capabilities to the Common Foreign and Security Policy (CFSP), this idea represented a new element in the European integration process.

The Cologne European Council meeting in June 1999, triggered by external challenges such as the war in Kosovo, decided to develop further the scope of Common Foreign and Security Policy (CFSP) and launched the European Security and Defense policy (ESDP) establishing ESDP's mission roots on what is known as the three "Petersberg Tasks", (1) humanitarian and evacuation missions, (2) peace keeping missions, and (3) combat missions for crisis management (including disarmament missions and missions to restore peace)[3]. The European Council has agreed that "the Union must have the capacity for autonomous action, backed up by credible military forces, the means

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[1] Maartje Rutten, *"From Nice to Laeken European Defense: Core Documents,"* Chaillot Paper No. 51, WEU Institute for Security Studies, April 2002, http://www.iss-eu-org/chaillot/chai51e.pdf, accessed 15 March 2004.

[2] Ibid.

[3] ESDP Policy, available at http://europa.eu.int/comm/external_relations/esdp/, accessed 16 February 2004.

to decide to use them, and a readiness to do so, in order to respond to international crises without prejudice to actions by NATO"[4]. Thus, in December 1999, the Helsinki European Council set the Headline Goals 2003 (HG) in terms of military capabilities and created the European Rapid Reaction Force (RRF).

For the Union this meant to be able, by the year 2003, to deploy within 60 days, and sustain for at least one year, up to 60,000 persons (or up to 15 brigades) capable of executing the full range of Petersberg Tasks[5]. It must be emphasized that the achievement of these goals did not involve the establishment of a European army. The deployment of national troops was to be based on autonomous decisions taken by Member States.

The Union defined arrangements for the possible participation of third countries (European Member States of NATO not part of the Union, third countries and other candidate countries for accession to the Union) and other potential partners in EU military crisis management. In addition, permanent arrangements had been agreed for EU-NATO consultation and cooperation. Meetings between the Union and NATO were to be held on a regular basis in certain specific fields with a view to enabling the Union, where necessary, to launch operations using NATO assets and capabilities (notably planning capabilities and command options).

The aim of all this work was that the EU should become rapidly operational. The EU also decided to develop the civilian aspects of crisis management in several priority areas defined by the Feira European Council (June 2000): police, strengthening of the rule of law, strengthening civilian administration and civil protection[6]. Discussions have continued on the implementation of the Petersberg Tasks. These discussions have been transformed into policies and reflected "the Union's consistent approach to

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[4] Available at http://www.europa.eu.int , accessed 27 March 2004.

[5] Jean-Yves Haine, *ESDP: An Overview, European Union*, Institute for Security Studies, available at http://www.iss-eu.org/esdp/01-jyh.pdf, accessed 12 March 2004.

[6] Available at http://www.europa.eu.int, accessed 27 March 2004.

support missions outside the Union for peacekeeping, conflict prevention and strengthening international security based on UN principles"[7]. This group of measures is today called the European Security and Defense Policy (ESDP).

One of the very first steps the Union took since the launch of ESDP was to develop military and political structures that would improve EU's operational and military capabilities based on contributions by its Member States. The motivation was high, and with few exceptions, the first contribution in terms of human resources and infantry was a reality. As expected, a number of shortfalls were identified and EU members decided to create a European Capability Action Plan, (ECAP), in order to identify capable solutions. ECAP panels until now have provided useful feedback. Furthermore, EU's performance on missions launched under ESDP status offer a better view of the capabilities that need to be improved. In Brussels on 17-18 June 2004, the 25 EU member states approved the document entitled Headline Goals 2010 and have been committed to be able to respond to crises throughout the world by 2010[8].

> On decision making, the ambition of the EU is to be able to take the decision to launch an operation within 5 days of the approval of the Crisis Management Concept by the Council. On the deployment of forces, the ambition is that the forces start implementing their mission on the ground, no later than 10 days after the EU decision to launch the operation[9].

The new Headline Goals include the main parameters for further development of EU's military capabilities, and the creation of the Battlegroups as a complement force to EU's Rapid Reaction Force. The future will provide many military challenges for the European Forces. Therefore, among many areas to consider, Electronic Warfare (EW) is a key aspect, if EU's military autonomy is to be implemented. This is one of the critical military capabilities that was missing

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[7] Martin Ortega, *Petersburg Tasks and Missions of the Europeans Forces*, available at, http://www.iss-eu.org/esdp/04-mo.pdf, accessed 10 April 2004.

[8] Informal meeting of Defense Ministers, Brussels 5-6 April 2004, available at http://ue.eu.int/solana, accessed 21 May 2004

[9] ESDP Council Conclusions, 2582nd Council Meeting, External Relations, Brussels, 17 May 2004.

from the European inventories during the Kosovo campaign, making them depend almost completely on U.S. capabilities. This is also one area where European co-operation could make a difference.

> EW is an important capability that can advance desired military, diplomatic, and economic objectives or, conversely, impeded undesirable ones. In a military application, EW provides the means to counter, in all battle phases, hostile actions that involve the electromagnetic (EM) spectrum- from the beginning when enemy forces are mobilized for an attack, through to the final engagement[10].

B. PURPOSE OF THESIS

The purpose of this thesis is to demonstrate the perspectives for the development of the European Security and Defense Policy and to stress the need to consider Electronic Warfare as a critical asset in the military and technological capability options of the ESDP. The study concludes with an evaluation of these ideas and recommendations for the development of ESDP.

C. RESEARCH QUESTIONS

The thesis will review key authors and articles in the literature, looking for the following questions:

- What are the role and the plans of ESDP in the European Union? Is the EU committed to these plans?

- What are ESDP's current status and issues?

- What are the Petersberg Tasks and the Headline Goals?

- What are the perspectives for the development of the ESDP?

- What are the operational and technical capabilities necessary for the implementation of Petersberg Tasks? What capabilities will the Europeans develop and improve and in what time frame?

- How Electronic Warfare contributes to the effectiveness and efficiency of the ESDP and the European Rapid Reaction Force? As demonstrated in Kosovo, high intensity conflict requires EW assets. Do European nations on the whole posses the political will to support the development of a power projection force at this time?

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[10] Anthony E. Spezio, *Electronic Warfare Systems*, IEEE Transactions on Microwave Theory and Techniques, Vol. 50, No. 3, March 2002, p. 633.

- What would be the effectiveness of the EU aircraft stand-off jamming against future threats and early warning radars during high intensity conflict operations?

- What is the relation between EW/ESDP and NATO/U.S.? How does EU's effort to develop an autonomous defense mechanism affect the transatlantic relationship?

The answers to these questions offer the opportunity to explore the main idea behind ESDP's overall existence and behavior.

D.   SCOPE AND LIMITATIONS

The topic of ESDP, combined with the issue of EW, is worthy of a dissertation, and this thesis attempts to examine and analyze the current common European Security and Defense Policy (ESDP) status with the objective (1) to examine the short, mid and long term options for the development of ESDP, (2) define the operational and technical capabilities necessary for implementation of the Petersberg Tasks, (3) explore the current status of ESDP by focusing on Electronic Warfare (EW) as an option that contributes to the efficiency of the ESDP and the European Armed forces, (4) examine the future relations of EW and ESDP with NATO and the United States, (5) use of the IMOM model for wargaming an EU RRF unilateral course of action against an hypothetic enemy and (6) make recommendations in order for the member states of the European Union to conduct conflict prevention and crisis management operations, with the intention of strengthening the Union's role and influence in international politics, and at the same time, with no intention of overcoming NATO's and the U.S.'s role and capabilities in the field of collective defense. This research will be based on a systematic study of related books, articles and reports. The scope will not include (a) a detailed plan for the implementation of military capability options in the ESDP (b) a detailed analysis required for the implementation of EW in the ESDP and (c) a detailed evaluation of the current relation between EW/ESDP and NATO/U.S.. Finally, as a Major of the Hellenic Republic, an ally of the United States and as a citizen of the European Union, the author strongly believes that ESDP is a topic that will dominate European military affairs and EW plays a significant role in ESDP's performance.

E.   METHODOLOGY

The topic of ESDP, combined with the issues of the EW, is vast and difficult to summarize in one thesis. The thesis starts with a description of the main EU Treaties and continues with an analysis of ESDP's current and future prospects. Through the study of ESDP's current status, it is evident that an important military component, i.e., EW, has been addressed but not emphasized. In order to demonstrate EW's "weight", an imaginary scenario, under the name "Save Atlantia 2008", has been created in which computer software simulates EW effects, i.e., the IMOM model. The IMOM Model clearly illustrates EW's power in the Air Force. Finally, the necessary recommendations and conclusions are made at the conclusion of this thesis based on the existing material.

F.   ORGANIZATION OF STUDY

The thesis is organized into eight chapters.

- *Chapter I* begins with a brief introduction, followed by the purpose and research questions, the scope and limitations, methodology, the organization of this study, and finally the findings.

- *Chapter II* defines ESDP and gives a brief historical overview of the development of the European Union, the formation of CSFP and ESDP in the European Union, and finally the Petersberg Tasks.

- *Chapter III* examines EU efforts, under the ESDP status, to develop the whole spectrum of operational and military capabilities necessary to implement the Petersberg Tasks and provides useful information about EU's recent tasks and deployments. It also identifies EW as a missing element that needs to be addressed more thoroughly.

- *Chapter IV* examines EW as an option that contributes to the operational effectiveness and efficiency of ESDP and the European forces. Additionally, through references to the several Electronic Warfare definitions, this study provides a necessary background on the operational functions of EW. In addition, there is a brief introduction for the Improved Many on Many (IMOM) model. The IMOM will be used to model the radar and Tactical Jamming System and conclusions will be based on the theoretical expected jamming effectiveness of the Joint European Air Force against several radar systems in an imaginary scenario.

- *Chapter V* examines an imaginary scenario "Save Atlantia 2008" and shows how modern EW tools, such as those used in the IMOM Model, provide a competitive advantage on the battlefield.

- *Chapter VI* focuses on the debate over the ideal level of interaction and cooperation between Europe and the United States on security issues in the 21st century.

- *Chapter VII* provides conclusions and recommendations and discusses implications for the future of the ESDP and the European armed forces.

G.   FINDINGS

The European Union is keener than ever to play a significant role in the global arena and unanimously and autonomously address security threats. However, due to military deficiencies, European forces do not have the momentum to address effectively high intensity conflicts without NATO's assistance. EW is a key asset that if explored and developed properly, will strengthen not only EU's military autonomy and but also NATO's overall performance.

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II.   HISTORIC BACKGROUND

The end of WWII marked a new era for Europe.   Leading European countries felt the need to secure peace and lessen the threats created in the past by uncontrolled nationalism and xenophobia.   One of the most enthusiastic supporters of the idea of the European unity was Winston Churchill. He stated in 1946:

> The structure of the United States of Europe will be such as to make the material strength of a single state less important. The fighting has stopped. But the dangers have not stopped. If we are to form a United States of Europe or whatever name it may take, we must begin now.[11]

At this point in time, the idea of a united Europe found the President of the United States in agreement. President Eisenhower stated in 1951:

> I believe in it this much, when I came over here. I disliked the whole idea of a European Army, and I had enough troubles without it. However, I have decided that it offers another chance for bringing another link here, so I made up my mind to go into the thing with both feet. So I am going to try to help, and I realize that a lot of my professionals' associates are going to think I am crazy. But I tell you that joining Europe together is the key to the whole question.[12]

A.   THE DEVELOPMENT OF THE EUROPEAN UNION

The first step began in May 1950 when the French foreign minister, Robert Schuman, proposed a plan for the creation of an authority to control the production of coal and steel in West Germany and France. This plan was called the Schuman Plan[13]. Definitely, it was for this reason that those desired a federal state of Europe, hoped that this plan would lead to an expansion of integration

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[11] Edward Fursdon, *The European Defense Community, A History*, St. Martin Press, New York, 1980, p. 14.

[12] Ibid., p. 119.

[13] The real aim of this plan was to make another war between Germany and France impossible by integrating an important element in a country's ability to wage war: heavy industry. Schuman's long-term objective was to achieve reconciliation between Germany and France and increasing European integration, with the ultimate goal of a European federation. Schuman is considered one of the founding fathers of European integration. Available at, http://www.dadalos-europe.org, accessed 29 March 2004.

into other areas of cooperation. In June 1950, a conference was called to examine this proposal, and in April 1951, the "Treaty of Paris" was signed in France by the Federal Republic of Germany, France, Italy, Belgium, Luxemburg and Holland. The countries agreed to bring their coal and steel industries together into a single market and created the European Coal and Steel Community[14] (ECSC).

In 1958, the six members of ECSC signed the Treaty of Rome in Rome that created the European Economic Community[15] (EEC) and the European Atomic Energy Community (EAEC). The treaty became active on 1 January 1958. The main goals of the EEC, known as the Common Market, were the development of common agricultural, transport, competition and economic policies among members. EAEC, also known as EURATOM, aimed to promote nuclear R&D, (Research and Development) for civilian use and to develop extensive commercial outlets for nuclear fuel and energy[16].

During the period between the Treaty of Rome and the first significant amendment of this treaty, called the Single European Act[17] (SEA), the EEC welcomed six more members. Denmark, Ireland and the United Kingdom joined the EEC in 1973. Greece joined in 1981 and Spain and Portugal joined the EEC in 1986. By 1986, the number of EEC members doubled. In addition, during this phase, another international organization was formed in 1973, the Organization

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[14] History of EU, Stage 1, p. 22, available at http://www.dadalos-europe.org. accessed 29 March 2004.

[15] The EEC had as its aim the eventual economic union of its member nations, ultimately leading to political union. It worked for the free movement of labor and capital, the abolition of trusts and cartels, and the development of joint and reciprocal policies on labor, social welfare, agriculture, transport, and foreign trade. Source available at http://www.dadalos-europe.org, accessed 29 March 2004

[16] History of EU, Stage 2, p. 24, available at http://www.dadalos-europe.org, accessed 29 March 2004.

[17] The Single European Act (SEA), signed in Luxembourg and the Hague. The treaty became effective on 1 July 1987. The goal of this treaty was to obtain an internal market. SEA expanded EU's scope in several areas (research and technology, environment), as well as improving decision-making procedures. Source available at http://www.dadalos-europe.org, accessed 29 March 2004.

for Security and Co-operation in Europe[18] (OSCE), which became the largest regional security organization in the world with 55 progressively participating countries from Europe, Central Asia and North America.

The second largest reform, after SEA, was the Treaty of Maastricht, also known as the Treaty on European Union, which came into force at the end of 1993. If the internal market project formed the focal point of the SEA, it was the economic and monetary union that was the cornerstone of the Treaty of Maastricht. As expected, in Maastricht, it was decided to move towards an economic and monetary union (EMU) following an "irreversible? three-phase program"[19]. Following the Werner Plan (1970) and the European Monetary System or EMS (1979), this program represented the third attempt at achieving EMU, which finally went into effect on 1 January 1999. The Maastricht Treaty renamed the European Community to the European Union by forming what is known as the three pillars of the EU: the supranational[20] European Community (EC) pillar along with the two intergovernmental pillars; the Common Foreign and Security Policy (CFSP) and the Justice and Home Affairs, (Shown in Figure 2.1).

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[18] OSCE is still active in early warning, conflict prevention, crisis management and post-conflict rehabilitation.

[19] Source available at http://www.dadalos-europe.org, accessed 29 March 2004.

[20] Supranational structures represent the surrendering of sovereign rights. The first supranational European organization was the European Coal and Steel Community (ECSC), available at http://www.dadalos-europe.org, accessed 29 March 2004.
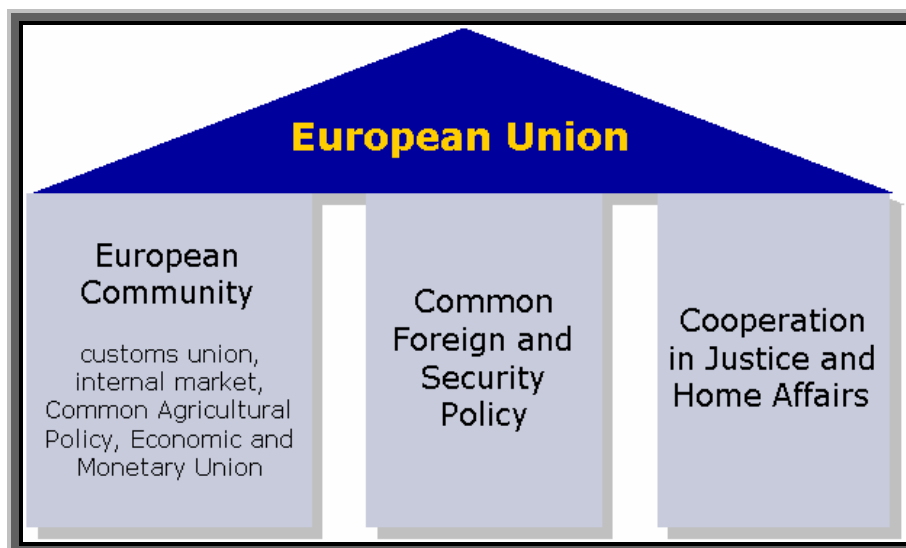
Figure 2.1.   The Three Pillars of the EU[21]

The *EC Pillar* is the generic term for three different European communities:

- European Coal and Steel Community (Treaty of Paris),

- European Atomic Energy Community and the European Economic Community (Treaty of Rome),

- The Treaty of Maastricht, to which several important amendments and changes have been made[22].

It is the most important and most comprehensive pillar. The Treaty of Amsterdam strengthened its powers in 1997, and as did the Treaty of Nice in 2001 as well.

The *Common Foreign and Security Policy* (CFSP) formed the "second pillar" and built upon the intergovernmental cooperation in foreign policy. The Maastricht Treaty replaced the "European Political Cooperation"[23] (EPC) with the Common Foreign and Security Policy (CFSP). In addition, the Treaty formulated

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[21] Figure available at, http://www.dadalos-europe.org, accessed 29 March 2004.

[22] Ibid.

[23] European political cooperation (EPC) was introduced informally in 1970 and formalized by the Single European Act (SEA) and in effect since 1987. The object is consultations between the Member States in foreign policy matters. The Member States have regard for the views of the European Parliament, and wherever possible, take common positions in international organizations. EPC was superseded by the common foreign and security policy. Available at, http://www.daidalos-europe.org, accessed 29 March 2004.

the goal of eventually introducing a common defense policy, which might in time lead to a common defense system. As explained in the following pages, part of the CSFP is the European Security and Defense Policy (ESDP), which has been created to improve the Union's police and military capabilities[24].

Cooperation in Justice and Home Affairs formed the "third pillar". It represents an agreement by EU member states to cooperate on justice and home affairs and was also made outside of the treaty establishing the European Community[25].

The EU progressed significantly since the Treaty of Rome into a multifunction Union and achieved high levels of integration. Moreover, Finland, Austria and Sweden, joined the EU in 1995, and a further expansion of EU membership to 15 member countries were accomplished. The intent was to terminate the process of reform in the Treaty of Amsterdam, which, in turn, represented the third largest treaty revision after the SEA and the Treaty of Maastricht. The Treaty of Amsterdam was signed in 1997 and went into effect on 1 May 1999. From a legal point of view, the Amsterdam Treaty amended certain provisions of the EU Treaty. Its purpose was not to replace other treaties but to extend them[26].

However, it soon became obvious that the Treaty of Amsterdam failed in one of its main objectives, which was to prepare the EU for enlargement against ongoing accession negotiations with 12 other nations (Bulgaria, Estonia, Slovenia, Latvia, Lithuania, Malta, Poland, Rumania, Slovakia, the Czech

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[24] Maartje Rutten, *"From Nice to Laeken European Defence: Core Documents,"* Chaillot Paper No. 51, WEU Institute for Security Studies, April 2002, available at, http://www.iss-eu.org/chaillot/chai51e.pdf, accessed 15 March 2004.

[25] Available at, http://www.daidalos-europe.org, accessed 29 March 2004.

[26] Ibid.

Republic, Hungary and Cyprus[27]). Consequently, the next treaty, The Treaty of Nice, represented the fourth largest amendment to the Treaty of Rome after the Single European Act, the Treaty of Maastricht and the Treaty of Amsterdam (refer to Figure 2.2).

Given that the Treaty of Amsterdam had not fulfilled its purpose, the government conference in 2000, and the subsequent meeting of the Council of Europe in Nice (December 2000), were once again concerned with undertaking the issue of institutional reforms faced with enlargement. The EU members at Nice tried to secure that the Union could still function with almost twice the members (27 rather 15). The following five issues were at the centre of negotiations: the size and composition of the Commission; the weighting of votes in the Council; the possibility of expanding the scope of decisions taken using qualified majority voting; other questions arising from the remnants of the Treaty of Amsterdam; and closer cooperation[28].

Overall, the structure of the European Union has been based on treaties summarized in the following Figure 2.2 and the three pillars presented in Figure 2.1. Today, and since 1 May 2004, the EU has 25 country members[29]. In addition, the second pillar along with the treaties that led to a common European foreign policy will be presented in the following paragraphs.

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[27] The applications of the countries were given on December 1997. Accession negotiations officially began with these countries on February 2000 in Brussels. Turkey was also given candidate status, even if it remains unclear as to if and when negotiations will begin. Also taking into account the other five southern European countries (Albania, Bosnia, Yugoslavia, Croatia and FYROM), to which the promise of EU membership has been held out within the scope of the Stability Pact, along with Norway and Switzerland, whose membership attempts are currently on hold, the total is 35 nations! Available at http://www.daidalos-europe.org, accessed 29 March 2004

[28] Available at http://www.daidalos-europe.org, accessed 29 March 2004.

[29] Since 1 May 2004, the EU has 25 countries members: Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, Nederland, Austria, Portugal, Finland, Sweden, United Kingdom. The new EU members are: Estonia, Slovenia, Latvia, Lithuania, Malta, Poland, Slovakia, the Czech Republic, Hungary and Cyprus, and the candidates members are: Bulgaria, Romania, Turkey. Available at http://www.daidalos-europe.org, accessed 29 March 2004.
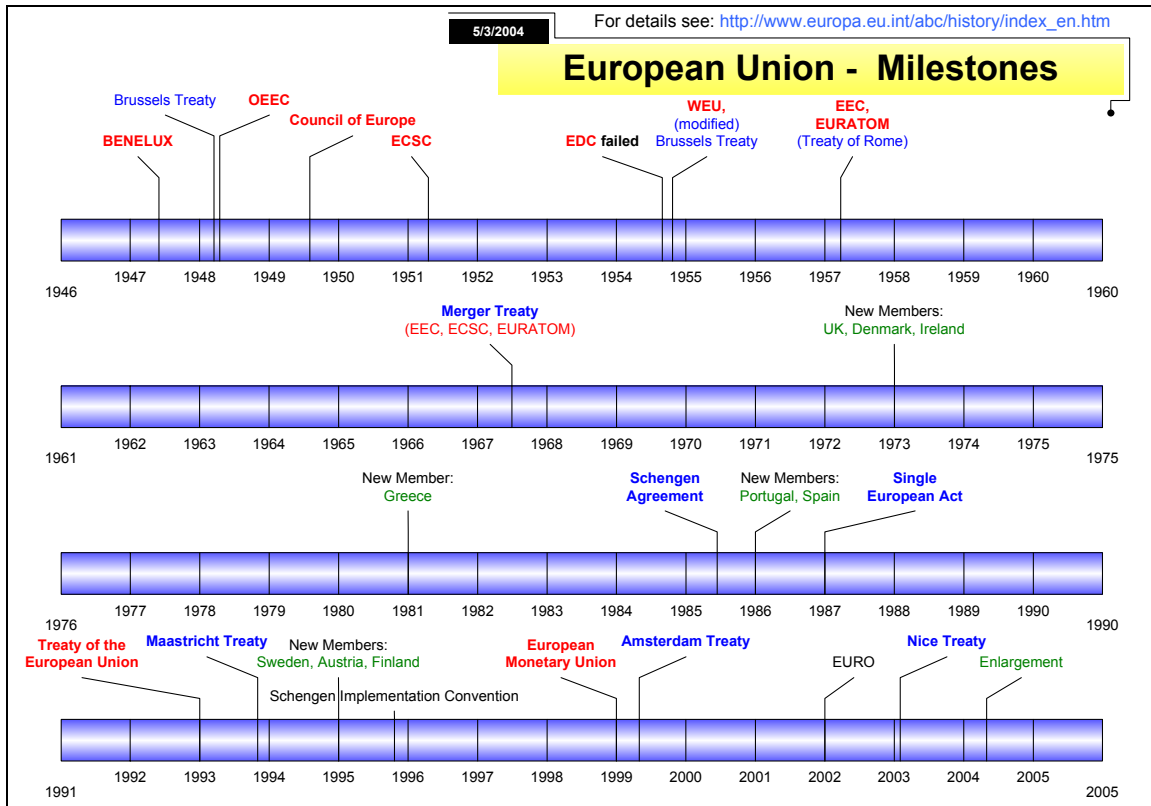
Figure 2.2.   European Union Milestones[30]

B.   THE "SECOND PILLAR" AND THE DEVELOPMENT OF THE EUROPEAN SECURITY AND DEFENSE POLICY (ESDP)

The need among country members to obtain a common foreign security policy became a necessity at an early stage. The fundamental objective was to become a noteworthy player in the international arena. Therefore, the idea of a common European foreign and defense policy extends back to 1952 when the six members of ECSC, including France and Germany, signed an agreement to establish a Common European Defense Community (EDC). The plan, known as the Pleven Plan, was extremely progressive as it even proposed that a joint European army under a joint command could replace national armies[31]. As expected, the countries were not mature enough to accept this plan. It was one

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[30] Figured available at, http://www.europa.eu.int/abc/history/index_en.htm, accessed 29 March 2004.

[31] EU Glossary, p. 18, available at http://www.dadalos-europe.org/int/materialien/glossar.htm, accessed 29 March 2004.

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thing for traditional enemies such as France and Germany to cooperate in trade and quite another to share a common army almost 10 years after Germany's invasion of France and WWII. Naturally, in 1954, the French Parliament disproved the idea and the whole plan collapsed[32].

In the early 1960s, the Fouchet Plans[33] envisioned a common foreign and defense policy. Unfortunately, the member countries could not find a common platform of cooperation and negotiations struggled. The 'Davignon Report'[34], in 1970, suggested possible ways of moving forward toward a common foreign status. This became a starting point for the European Political Cooperation[35] (EPC). The Soviet invasion in Afghanistan and the Revolution in Iran made clear that the European Community needed to have a cohesive foreign policy in the international scene. It took 17 years to make EPC an official tool of the European Community. Finally, the amendment of Luxembourg and the Hague in 1987 included EPC in the Single European Act (SEA)[36].

During the 1990's, it became clear that Europe had entered a new era. The end of the Cold War, the reunification of Germany, the collapse of the Soviet Union and the former republic of Yugoslavia had been foreign affair issues that effected the EC in more than one aspect. The member countries felt the need to upgrade EPC by forming CFSP[37], the second pillar in the structure of the European Union (refer to Figure 1). Article 11 appoints CFSP's key principles:

- to safeguard the common values and fundamental interests of the Union;

- to strengthen the security of the Union;

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[32] Edward Fursdon, *The European Defense Community, A History*, St. Martin's Press, New York, 1980, p. 23.

[33] "*The Common Foreign and Security Policy: Introduction,*" available at europa.eu.int/scadplus/leg/en/lvb/r00001.htm, accessed 29 March 2004.

[34] EU Glossary, p. 20, Ibid.

[35] Ibid.

[36] Ibid.

[37] The Treaty on the European Union, known as Treaty of Maastricht, introduced Title V and replaced EPC with CFSP. EU Glossary p. 7, Ibid.

- to preserve peace and strengthen international security;

- to promote international cooperation;

- to develop democracy and the rule of law, including human rights[38].

The tools provided to CFSP are: 'common positions', in which the member states should follow and implement as national strategies and 'joint actions' under the sponsorship of CFSP. In this way, the Union is able to reinforce its international position through decisions, international treaties, declarations and contacts with other countries. Since the Treaty of Amsterdam, the Secretary-General of the Council has fulfilled the role of High Representative[39] of the CFSP. The current High Representative for the CFSP is Mr. Javier Solana Madariaga, who ascended to the post on 18 October 1999 for a period of five years[40].

Article II of the European Union Treaty states that one of the Union's objectives is to assert its identity on the international scene, in particular, through the implementation of a common foreign and security policy including the progressive framing of a common defense policy, which might lead to a common defense, compatible with that of the Atlantic Alliance[41].

C.   THE FORMATION OF EUROPEAN SECURITY AND DEFENSE POLICY (ESDP)

The *Maastricht Treaty or "Treaty on the European Union"* made significant progress toward the creation of a mechanism that would promote the fundamental interests of European Union at an international level.   The replacement of EPC by CFSP brought Europe closer to creating a common defense mechanism.   More specifically, the Maastricht Treaty included an

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[38] Alfredo Chamorro Chapinal, "The Security and Defense of Europe in the 21st Century-(NATO, WEU, OSCE)," Final Report, Madrid, May 2000, p. 48.

[39] Following the debate on whether to appoint a "Mr/Ms CFSP", a new position of High Representative for the common foreign and security policy has now been created by the Treaty of Amsterdam. The new position is held by the Secretary-General of the Council, whose task is to assist the Presidency of the Union in matters relating to common foreign and security policies. Available at http://www.daidalos-europe.org, accessed 29 March 2004.

[40] Available at http://ue.eu.int/cms3_fo/showPage.asp?id=248&lang=EN&mode=g, accessed 29 March 2004.

[41] Alfredo Chamorro Chapinal, Ibid.

attached declaration in which "the Western European Union (WEU[42]) should be utilized and promoted as the defense component of the EU"[43].   In addition, another early development, the creation of the Euro-corps by France and Germany, in May 1992, came to disturb the "stagnant waters".   France and Germany wanted to use the Euro-corps to facilitate the Western European Union (WEU) to act according to the order of EU by helping defend NATO's territory, in peacekeeping activities outside the NATO area, and in humanitarian operations. Their components were drawn from the five - member states of France, Germany, Belgium, Spain, and Luxemburg and they comprised 60,000 troops[44]. Both NATO and the WEU could make use of the Euro-corps. Additionally, Great Britain agreed to commit 20,000 troops to that force, to be drawn mainly from its NATO Reaction Force (NRF). France would probably contribute the same number of troops; Germany offered 18,000 and Spain 6,000 men[45].

The same year, in June, in an effort to upgrade the role of WEU, the Foreign and Defense Ministers of WEU member States met at the Petersberg Hotel, near Bonn (Germany) and issued the Petersberg Declaration[46].   This common Declaration set the new missions that the organization was expected to execute: "humanitarian and rescue tasks, peacekeeping tasks, and tasks of combat forces in crisis management, including peace-making"[47]. This was the first successful attempt at European defense integration. Also, this action gave new impetus to the idea of a common "European Army", and a common European Security and Defense Policy.

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[42] Established in 1948, WEU was a defense organization separate from the EU that consisted of 28 countries.

[43] Available at http://www.daidalos-europe.org, accessed 29 March 2004.

[44] Francois Heisburg, "*European Defense: Making it Work*," Chaillot Paper 42, September 2000, p. 47.

[45] Eric Eagle, *The Eurocorps: A European Army?* Available at http://www.geocities.com, accessed on February 2004.

[46] On 19 June 1992, Available at http://www.daidalos-europe.org, accessed 29 March 2004.

[47] Alfredo Chamorro Chapinal, p. 50.

Unfortunately, this declaration did not prove forceful enough to provide a common political and military approach to deal with the dissolution of Yugoslavia and the resulting conflicts that the EU faced during the 1990s. In the beginning, this conflict was not considered to be a case for NATO. Luxemburg's foreign minister, Jacques Poos, speaking as chairman of the EC Council of Ministers, declared that it was

> the hour of Europe, and that if one problem can be solved by the Europeans, it is the Yugoslav problem. This is a European country and it is not up to the Americans and not to anybody else[48].

However, whatever Europe wanted to believe about its abilities and its power, the reality was different. NATO was assigned very quickly with the mission of the implementation of the Dayton arrangements[49]. Nevertheless, still distinctive was the opinion from few observers that "The United States must stay out of war in the Balkans in order to stay in Europe"[50]. From December 1995 to December 1996, NATO forces were present on the ground in Bosnia as part of the Implementation Force, known as IFOR and a size of 60,000 troops, and since 1996, IFOR has been replaced by another NATO-led force, the Stabilization Force (SFOR) with a size of 32,000 troops, with only 6,000 from non-NATO countries[51].

The Union had been successful up to that point by exercising common economic policies under Pillar I but it had dramatically delayed the implementation of the second pillar. WEU and NATO still retained a leading role in European security. Due to the dissatisfaction related to the existing division of

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[48] David S. Yost, *NATO Transformed,* US Institute of Peace Press, Washington, D.C., 1998, p. 193.

[49] Ibid., p. 195.

[50] NATO Handbook, Office of Information Press, 2001, p. 116.

[51] Ibid., p. 117.

labor between NATO and WEU, and in order to have more room to maneuver, some EU member states had developed ad-hoc military and political arrangements to manage external crises[52].

Current work on the EU's security and defense dimension was initiated at *St. Malo* in 3-4 December 1998. St. Malo has been widely considered as the starting point of the ESDP project. Prime Ministers Blair (United Kingdom), Jospin and President Chirac (France), issued a joint declaration aimed at addressing all the deficiencies. France and United Kingdom agreed that:

> The EU needs to be in a position to play its full role on the international stage. The Union must have the capacity for autonomous action, backed up by credible military forces, the means to decide to use them and a readiness to do so, in order to respond to international crises. Europe needs strengthened armed forces that can react rapidly to the new risks, and which are supported by a strong and competitive European defense industry and technology[53].

However, the real breakthrough in the development of a common security and defense policy came in 1999, or the year that Europe faced a vital crisis, the war in Kosovo. Overshadowed by the recent war, NATO's 50th anniversary Summit was held in Washington, D.C., on 24-25 April 1999. The Summit adopted two documents referring to the development of a European Security and Defense Identity (ESDI) within NATO and the EU's Common European Security and Defense Policy. The failure of the EU policies that followed Kosovo was the crucial point for the future decisions of the European Union and for their further agreements on a Common European Security and Defense Policy.

At the informal meeting of the EU Defense Ministers on 28 May 1999 in Bonn, decisive steps were initiated to design the European Security and Defense Policy. The decisions on these steps were finally taken during the course of the

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[52] Giovanna Bono, European Security and Defense Policy: Theoretical Approaches, the Nice Summit and Hot Issues, February 2002, p. 19, http://www.bits.de/CESD-PA/esdp02.pdf, accessed 15 March 2004.

[53] Maartje Rutten, "From St-Malo to Nice: European Defense: Core Documents," *Chaillot Paper 47*, May 2001, pp. 8, 9 and 13.

Summit meetings in Cologne, Helsinki, and Feira (refer to Figure 2.3). This process represented a brand-new element in the European integration process and the group of measures formed was called European Security and Defense Policy (ESDP), which aimed to provide military capabilities to the Common Foreign and Security Policy (CFSP). It was clear that the leading European countries pressed to move forward in the matter as soon as possible. However, the relationship between ESDP and NATO military authorities was and remains at this time, one of the hottest issues in the negotiation of ESDP, and will be explored and explained further in Chapter VI of this thesis.

1. The Launch of ESDP

At the *European Council's Cologne Summit*, in June 1999, the EU formally launched the common European Security and Defense Policy (ESDP). Since the legal basis for strengthening CFSP existed with the adoption of the Petersberg Tasks, the Council agreed that "the Union must have the capacity for autonomous action, backed up by credible military forces, the means to decide to use them, and a readiness to do so, in order to respond to international crises without prejudice to actions by NATO[54]". In order to achieve this goal, several specific institutional changes were made. As a consequence, it was agreed that most functions of the WEU would be transferred to the EU. This meant the development of new military and political structures in the EU, as follows[55]:

- The new political body known as the *Political Security Committee* (PSC). The PSC has been the leading body for decision making on CFSP and ESDP policies and acts both as a crisis monitoring and management body.

- The highest military body established within the Council known as the *European Union Military Committee* (EUMC). EUMC provides military advice and recommendations on the PSC on all military matters within the EU as and when requested, assesses the risk of potential crises and makes a financial estimate of the cost of operations and exercises.

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[54] Available at http://www.europa.eu.int, accessed 27 March 2004.

[55] Giovanna Bono, *ESDP: Theoretical Approaches, the Nice Summit and Hot Issues*, February 2002, pp. 23-24, available at http://www.esdpdemocracy.net/word/ESDP&Democracy.pdf, accessed 25 March 2004

- Finally, the *European Union Military Staff* (EUMS). EUMS consists of 135 officers and support staff. EUMS role is to provide early warning, situation assessments and strategic planning for Petersberg Tasks, and to implement the policies and decisions of the EUMC. It still remains unclear whether the EUMS will act mainly as an advisory body or will be involved in planning military activities as SHAPE does in NATO.

The Helsinki European Council, on 10-11 December 1999, set the Headline Goal (HG) in terms of military capabilities – known as Helsinki Headline Goal Catalogue 1999-2003 (HHC)[56]. It must be emphasized that the achievement of this goal does not involve the establishment of a European army. The commitment and deployment of national troops was to be based on autonomous decisions taken by Member States. All participating members, except Denmark that chose not to participate, agreed that their goals require the creation, by the year 2003, of an EU Rapid Reaction Force (RRF) with the following strength[57]:

- more than 500 kinds of land-,air- and naval units, as well as key or strategic capacities in seven areas: C3I, ISTAR, Deploy ability and Mobility, Effective Engagement, Protection and Survivability, Sustainability and Logistics, and General Support.

- a 100,000-man strong land force, which would support a force of 60,000 troops, and being able to deploy within 60 days, to operate and sustain for at least one year, capable of executing the full range of Petersberg tasks.

- an air element of between 350 and 400 fighter planes,

- a naval element of 80 ships[58].

Regardless, the RRF, EU decided that it should be military autonomous, have command, control and intelligence capabilities, and the core of the RRF

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[56] Ibid.

[57] The full details of the forces identified are confidential, but the major elements are as follows.

[58] Frans Osinga, *European Defense: Does Anyone Really Care?* June 2002, p. 4.

should be built from the Euro-corps[59]. The aim of this work was that the Union could become rapidly operational. The Union had also decided to develop the civilian aspects of crisis management in four priority areas defined by the *Santa Mara de Feira European Council*[60] (19-20 June 2000): police, strengthening of the rule of law, strengthening the civilian administration, and civil protection.

2.   The Definition of ESDP

At the *Laeken European Council Meeting,* in 14 and 15 December 2001, ESDP was proclaimed operational. It was emphasized that the development of means and capabilities would allow the Union "progressively to take on more demanding operations[61]". The European security concept prepared by Javier Solana indicated,

> we need to develop a strategic culture that fosters early, rapid, and when necessary, robust intervention. We should think particularly of operations involving both military and civilian capabilities. This is an area where we could add particular value[62].

Since then, a new EU Capability Conference, which was held in Brussels, in May 2003, issued the "Statement on Improving European Military Capabilities", in order to ask for more national commitments or launch specific programs to address current shortfalls. Progress made on capabilities and infrastructure will be addressed in the following chapter. The final reshape of the ESDP definition came with the Article 40.1 of the draft Constitutional Treaty adopted by the Convention (July 2003):

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[59] In May 1992, the creation of the Euro-corps by France and Germany, two historical enemies, in the beginning came to disturb the "stagnant waters" for a common European Defense. France and Germany wanted to use the Euro-corps to facilitate the Western European Union (WEU) to act according to the orders of the EU by helping defend NATO territory, in peacekeeping activities outside the NATO area, and in humanitarian operations. Their components are drawn from the five - member states of France, Germany, Belgium, Spain, and Luxemburg and they comprise 60,000 troops. Francois Heisburg, "*European Defense: Making it Work*," Chaillot Paper 42, September 2000, p. 47.

[60] Available at http://www.europa.eu.int, accessed 27 March 2004.

[61] Presidency Conclusions - Laeken, 14 and 15 December 2001, http://www.ecdel.org.au/archive/Laeken%20Presidency%20Conclusions.pdf, accessed 7 April 2004

[62] Martin Ortega, Petersburg Tasks and Missions of the Europeans Forces, available at, http://www.iss-eu.org/esdp/04-mo.pdf, accessed 10 April 2004.

The common security and defense policy shall be an integral part of the common foreign and security policy. It shall provide the Union with an operational capacity drawing on assets civil and military. The Union may use them on missions outside the Union for peacekeeping, conflict prevention and strengthening international security in accordance with the principles of the United Nations Charter. The performance of these tasks shall be undertaken using capabilities provided by the Member States[63].

Moving a step forward, at the *Capability Commitment Conference,* on 20 November 2000 in Brussels, EU member states presented their national contributions[64] to meet the EU Petersberg tasks. In fact, the "Military Capabilities Commitment Declaration"[65] expressly states that the member states committed themselves beyond 2003 "to medium and long-term efforts..., particularly in the framework of the reforms being implemented in their armed forces"[66]. As a final point, the *Nice European Council (2001)* decided also that "the defense aspects of Europe's CFSP will no longer be framed by the EU's former defense arm, the WEU, but by the EU itself"[67].

There is already agreement on the so-called Battle Groups concept, which is a key instrument in the new EU military planning. Under the scheme, each contingent would have 1,500 elite soldiers and could be deployed within two weeks. Member states are to start contributing to these multinational high readiness joint packages at the beginning of the second semester of 2004. These rapidly deployable Battle Groups are supposed to be completed in 2007[68].

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[63] Martin Ortega, Ibid.

[64] Analysis on the national contributions refer to CH.

[65] WEU Council of Ministers, *Audit of Assets and Capabilities for European Crisis Management Operations*, recommendations for strengthening European capabilities for crisis management operations, Luxemburg, 23 November 1999.

[66] Ibid., p. 27.

[67] Title V: Provision on a CFSP in article 17 of the Nice Treaty that replaces article 17 of the Amsterdam Treaty, http://ue.eu.int/Newsroom, accessed 17 March 2004.

[68] "EU Defense Ministers Admit Global Responsibility," available at http://euobserver.com/?aid=16141&rk=1, accessed 17 May 2004.

3. ESDP and Terrorism

Furthermore, since 11 September 2001, the European Union and its member states have considered terrorism a vital issue of its security policy. A number of initiatives have been taken to confront this problem. Also, strong cooperation with the United States has been initiated when necessary. In particular, the *Seville European Council (21-22 June 2002)* endorsed the following statement:

> 1. The European Council reaffirms that terrorism is a real challenge for Europe and the world and poses a threat to our security and our stability. To this end, the extraordinary European Council meeting on 21 September 2001 decided to step up the action of the Union against terrorism through a coordinated and inter-disciplinary approach embracing all Union policies, including development of the Common Foreign and Security Policy (CFSP) and making the European Security and Defense Policy (ESDP) operational.

> 2. The Common Foreign and Security Policy, including the European Security and Defense Policy, can play an important role in countering this threat to our security and in promoting peace and stability. Closer cooperation among the Member States is being put into practice to take account of the international situation created by the terrorist attacks of 11 September[69].

In the aftermath of the Madrid bombings, at the Brussels European Council on 17-18 June 2004, the European Council adopted a wide-ranging declaration on terrorism, appointed an EU counter-terrorism coordinator and established the Visa Information System and the Europol and the Eurojust agreement. As regards the ESDP, the Council welcomed the report by the Secretary-General/High Representative on integrating an *intelligence capacity* on all aspects of the terrorist threat. On the practical and operational front, the European Council welcomed the re-establishment of the Counter Terrorism Task

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[69] Presidency Conclusions - Seville, 21 and 22 June 2002, http://www.ecdel.org.au/whatsnew/2002/presidency_conclusions_seville.htm, accessed 7 April 2004 and http://www.eurunion.org/legislat/Defense/SevilleESDP&Terror.htm, accessed 18 March 2004.

Force within Europol. Finally, by the end of this year and through a coordinated approach, the ESDP will prepare an overall strategy to enhance the protection of critical infrastructures[70].

However, the most significant event in the fight against terrorism is the EU-US declaration on Combating Terrorism at Dromoland Castle of 26 June 2004. The Declaration renewed the EU-U.S. commitment to developing further the cooperation against terrorism within the framework of the New Transatlantic Agenda. Emphasis is on the achievement of seven objectives, through transatlantic cooperation, commitment, dialogue and action at all levels[71].

4.   ESDP Relations with Other Organizations

The description of ESDP has three interesting characteristics. First, it contains three sufficiently broad terms (peacekeeping, conflict prevention and strengthening international security) that encompass all possible operations. Second, it does not refer to any particular geographical zone, as there were many who thought that it would be a mistake to introduce limitations. Third, the description stresses the respect for the principles of the UN Charter. Although it can be expected that EU forces would be used mainly in the European region and its neighborhood, EU forces could undertake operations in any part of the world. The European security concept presented by Javier Solana to the Thessalonica summit (Greece) points out: "our traditional concept of self-defense –up to and including the Cold War– was based on the threat of invasion. With the new threats the first line of defense will often be abroad[72]."

As far as the UN Charter is concerned, the EU and its member states have always stressed the Security Council's primary responsibility for the maintenance of international peace and security. Operations undertaken by the EU force must have, in principle, a mandate from the UN Security Council (UNSC). Some EU member states have insisted that the EU should have prior

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[70] Presidency Conclusions – Brussels EU Council, 17 and 18 June 2004, Paper 10679/04.

[71] EU-US Declaration on Combating Terrorism, 26 June 2004, Paper 10760/04 (Presse 205).

[72] Marin Lessenski, The Aftermath of 9/11: Implications for the European Union, available at http://www.iris-bg.org/publications/War_on_terror/Iris%203.pdf, accessed 12 March 2004.

authorization from the UN Security Council before any EU military operation. However, the EU force could also undertake military action in the absence of a UNSC mandate, if needed[73]. However, the situations in which this would be possible are quite limited: humanitarian (substantive aspect) interventions will be possible only when all member states agree (procedural/political aspect). If, for instance, there is a humanitarian catastrophe or an impending genocide, the EU (and European states, for that matter) would act even if a resolution from the Security Council cannot be obtained. In any case, as the Convention points out, EU military operations must always be conducted in accordance with the principles of the UN Charter[74].

The Union has also defined arrangements for the possible participation of third countries (European Member States of NATO which are not part of the Union and other candidate countries for accession to the Union) and other possible partners in EU military crisis management. In addition, permanent arrangements have been agreed upon for EU-NATO consultation and cooperation. Meetings between the Union and NATO, such as the Berlin Plus agreement of December 2002, are held on a regular basis in certain specific fields with a view to enabling the Union, where necessary, to launch operations using NATO assets and capabilities (notably planning capabilities and command options). The EU is not trying to compete with, or undermine NATO. The EU's operational focus is on lower-scale crisis management tasks, whereas NATO has a much broader military brief. The EU will only act when NATO is not involved[75].

In conclusion, the CFSP was launched little more than a decade ago to enhance Europe's capacities for common action. The policy is a necessary tool for a Europe that is still an economic power but lacks coordination and influence in security and military issues. The CFSP will be necessary for the continuation

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[73] Martin Ortega, Petersburg Tasks and Missions of the Europeans Forces, available at, http://www.iss-eu.org/esdp/04-mo.pdf, accessed 10 April 2004.

[74] Ibid.

[75] Daniel Keohane, Centre for European Reform, EU Security and Defense Policy, Spring 2004, available at http://www.cer.org.uk/defence/, accessed 17 April 2004.

of the European integration process. Part of the CSFP is the European Security and Defense Policy (ESDP), which has been created to improve EU police and military capabilities. Figure 2.3 shows a review of the CSFP/ESDP development.
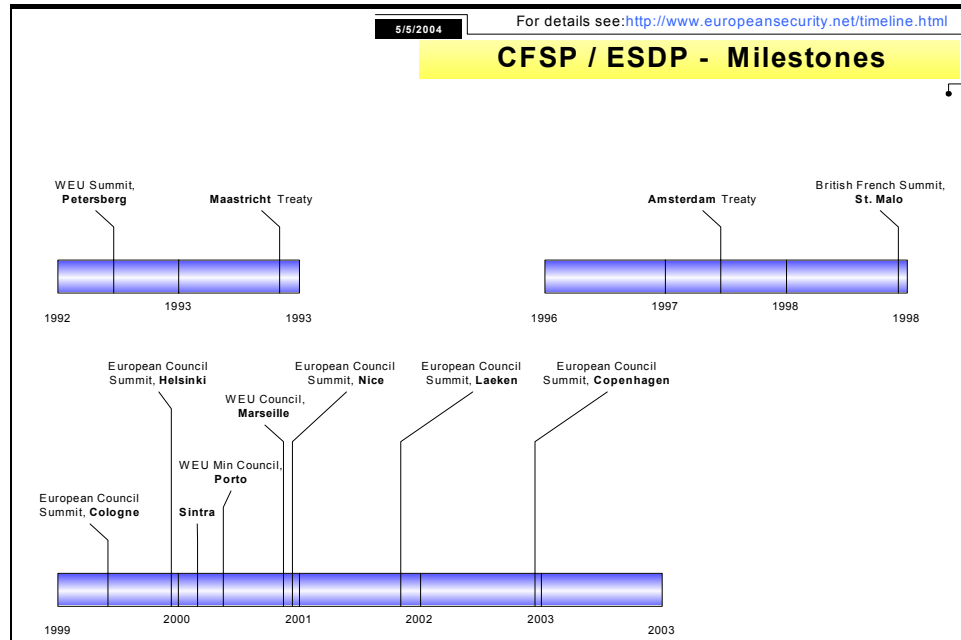
Figure 2.3.   CSFP/ ESDP Milestones[76]

ESDP has become operational since 2001 but there are key elements related to strategic mobility, command, control and communications that need to be surveyed. Nevertheless, someone needs first to explore the current status and issues related to ESDP and its Headline Goals. What are the achievements of ESDP concerning its police and military capabilities worldwide? Answers to these questions will be part of the following chapter.

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[76] Figured available at, http://www.europeansecurity.net/timeline.html. accessed 29 March 2004.

III.   ESDP'S OPERATIONAL AND MILITARY CAPABILITIES

The idea of a common European defense mechanism proved to be extremely challenging for EU's political, military and operational capabilities. Following the unveiling of the common European Security and Defense Policy (ESDP) and the development of new military and political structures such as the *Political Security Committee* (PSC); the *European Union Military Committee* (EUMC) and the *European Union Military Staff* (EUMS), EU member states had to set and meet specific objectives related to military infrastructure and human resources. Member states with few exceptions agreed to support the new policy and share assets and expertise.

As previously mentioned in Chapter II, the Helsinki European Council[77] set the Headline Goals (HG) in terms of military capabilities, known as the Helsinki Headline Goal Catalogue 1999-2003 (HHC). The first Capability Commitment Conference*,* on 20 November 2000 in Brussels, determined the need for contribution based on the HHC, in the following areas:

- Command and Control
- Strategic Intelligence
- Intelligence analysis and situation monitoring
- Strategic air and naval transport capabilities
- Availability, deploy-ability, sustainability, and interoperability of these forces
- The (further) development of strategic capabilities in the areas of transport, headquarters, information and communication systems, and means of providing them with information

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[77] Held 10-11 December 1999.

- Several operational capabilities in the framework of a crisis – management operation (among which, search and rescue, Theatre Ballistic Missile Defense (TBMD), precision weapons, logistic support, simulation tools).[78]

A.   FIRST CONTRIBUTIONS, IMPROVEMENTS AND SHORTFALLS

EU member states presented their national contributions to meet the EU Petersberg tasks and the original Helsinki Headline Goals (HHG) through the Helsinki Force Catalogue (HFC). The catalogue included assets contributed per EU country (refer to Table 3.1) including the initial necessary infrastructure to form ESDP's Rapid Reaction Force (RRF).

A comparison between the HHC requirements and HFC available resources revealed 42 shortfalls[79], which the EU had to resolve. One of the clearly undermined main areas was the importance of "Electronic Warfare" since no provision was made for the creation of EW centre. "Analysis of recent conflicts has shown that there is shortage (in NATO in general but especially in EU countries) on means for EW"[80]. EW means are very complicated assets and need time to develop properly. Table 3.1, shows that only one country (i.e., Spain), vaguely mentioned EW. It is hardly acceptable that a sole member state could implement an EW concept.

At the Capability Improvement Conference, in November 2001, EU members decided to create a European Capability Action Plan (ECAP), in an effort to find and implement solutions that would suit the HGs.

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[78] TNO Physics and Electronics Laboratory, The Hague, The Netherlands & IABG, Munich, Germany, "*New Technologies in Defense Policy and Conflict Management: A Challenge for the EU,*" European Parliament-Directorate General for Research-Directorate A- the STOA programme, May 2001, p. 26, available at http://www.europarl.eu.int/stoa/publi/pdf/summaries/00-01-01sum_en.pdf, accessed 15 March 2004.

[79] Mrs. Aguiar, Rapporteur*, "*European Defence: Pooling and Strengthening National and European Capabilities -Reply to the Annual Report of the Council," Report submitted on behalf of the Defence Committee, RECOMMENDATION 741, Document A/1842, 3 December 2003, available at http://assembly-weu.itnetwork.fr/en/documents/sessions_ordinaires/rpt/2003/1842.html#P71_2074, accessed 18 April 2004.

[80] TNO Physics and Electronics Laboratory, p. 30, Ibid.

Country	Contribution
Austria:	*Land:* One mechanized infantry battalion, one light infantry battalion, one Nuclear, Biological, Chemical Defense unit, one "humanitarian civilian assistance package," one Civil-Military Cooperation (CIMIC) element one transport company, 100 observers/experts. *Air:* one helicopter transport squadron,
Belgium:	*Land:* one mechanized brigade, plus smaller units as part of humanitarian operation for up to six months. *Air:* 24 F-16 fighters, eight C-130 and two Airbus transports. *Navy:* two frigates, mine countermeasures (MCM) vessels.
Finland:	*Land:* one mechanized infantry battalion, one engineer battalion, one Transport Company, one CIMIC company. *Navy:* one MCM command and support ship. Joint: 15-30 experts/observers.
France:	*Land:* 12,000 troops from a 20,000 pool; Mechanized, light, airborne (for a year), and amphibious brigades headquarters. *Air:* Combined Air Operations Center, 75 combat aircraft, eight air-refueling aircraft, three long-range and 24 medium-range transports, two Airborne Warning and Control System aircraft, combat search and rescue (CSAR) helicopters. *Navy:* Two battle groups, each with one nuclear attack submarine (SSN), four frigates, three support ships, and maritime patrol aircraft. One would include the nuclear powered aircraft carrier *Charles de Gaulle* with 22 aircraft aboard. Mine counter-measures vessels. *Joint:* Permanent military operations headquarters at Creil if required, others at operational and tactical levels, satellite communications, reconnaissance satellites and aircraft. The Eurocorps headquarters has also been offered for the force.
Germany:	*Land:* Nucleus land component headquarters, up to 18,000 troops from a pool of 32,000 at division and brigade level, including armored, air assault, and light infantry brigade headquarters and seven combat battalions. *Air:* Nucleus air component headquarters, six combat squadrons with 93 aircraft, eight surface-to-air missile (SAM) squadrons, air transport, other support elements. *Navy:* Maritime headquarters, 13 combat ships, support. Joint: Permanent military operations headquarters at Potsdam if required, nucleus operational headquarters.
Greece:	*Land:* one operational headquarters, one mechanized or other brigade, one light infantry battalion, one attack and one transport helicopter company. *Air:* 42 fighter aircraft, four transport aircraft, one Patriot SAM battalion, one short-range air defense (SHORAD) squadron. *Navy:* Escorts, one submarine.
Ireland:	*Land:* one light infantry battalion, 40-strong Army Ranger Wing Special Forces unit, headquarters, observer, and support elements. 850 total.

Country	Contribution
Italy:	*Land:* one corps-level headquarters for six months, one division headquarters for a year, 12,500 troops from a 20,000 pool (including an airmobile brigade for up to six months and three other brigades), one railway-engineering battalion, special forces, one CIMIC group, one Nuclear, Biological, Chemical Defense company. *Air:* a Combined Air Operations Center (air component headquarters), 26 Tornado and AMX combat aircraft, six CSAR helicopters, four C-130J transport aircraft (from 2003), nine tactical transport aircraft, two air refueling aircraft, three maritime patrol aircraft, two SHORAD units. *Navy:* A sea or shore-based maritime component headquarters; one task group with one aircraft carrier (*Giuseppe Garibaldi*), one destroyer, three frigates, four patrol ships, one submarine, four MCM ships, two amphibious ships, one oceanographic vessel, eight helicopters.
Luxembourg:	*Land:* one Reconnaissance Company *Air:* one A400M transport aircraft. 100 total.
Netherlands:	*Land:* with Germany, Headquarters I German-Netherlands Corps, one mechanized Brigade, 11th Airmobile Brigade, one amphibious battalion. *Air:* one to two F-16 fighter squadrons; transport aircraft, SAM squadrons. *Navy:* Air defense and command frigates, multipurpose frigates, landing platform dock *Rotterdam*.
Portugal:	*Land:* one infantry brigade, including reconnaissance, armored, artillery, engineer, signals, logistics, military police, and CIMIC elements; two teams of military observers. Total 4000. *Air:* squadron with 12 F-16, four C-130 transports, 12 C212 tactical transports, three maritime patrol aircraft, four tactical air control parties, four medium transport helicopters. *Navy:* one frigate, one submarine, one survey ship, one support ship.
Spain:	*Land:* division headquarters to coordinate humanitarian operations and a brigade HQ for other operations, one brigade, mountain unit, one light infantry battalion at high readiness available as an immediate reaction force. *Air:* one Mirage F-1 squadron, one F/A-18 squadron each of 12 aircraft, six transport aircraft, two each surveillance, electronic warfare, and strategic transport aircraft (A400M). *Navy:* one carrier group including carrier *Principe de Asturias*, two frigates and support ships, one submarine, one MCM ship, Spanish-Italian Amphibious Force (SIAF).
Sweden:	*Land:* One mechanized infantry battalion including intelligence, electronic warfare/signals, reconnaissance, engineer, and explosive ordinance disposal units. *Air:* tactical reconnaissance element of four AJS 37 Viggen to be replaced in 2004 by eight JAS 39 Gripen multi-role fighters, one airbase unit (225 personnel), four C-130 transport aircraft. Navy: two corvettes, one support ship.

Country	Contribution
UK:	*Joint:* Permanent Joint HQ (Northwood) if required, at least one mobile joint headquarters, including a Combined Air Operations Center (CAOC). *Land:* either an armored or a mechanized brigade, each of which could be sustained for at least a year, or 16th Air Assault Brigade, which could be deployed for up to six months. Combat support forces such as artillery, air defense, and attack helicopters could also be deployed, supported by logistics forces. Total: 12,500. *Navy:* one aircraft carrier, two nuclear submarines (SSNs), up to four destroyers or frigates, and support vessels. An amphibious task group including one helicopter carrier and 3rd Commando Brigade could also be made available. The aircraft carrier, helicopter carrier, and submarines could not necessarily be sustained continuously for a whole year. *Air:* up to 72 combat aircraft, including naval fighters, with 58 associated support aircraft including 15 tankers, strategic transport aircraft, and Chinook and Merlin transport helicopters. This total would be available for an initial six months to cover initial theatre entry; for a longer-term commitment the number would reduce.
Denmark: No contribution; decided not to be involved in ESDP.	

Table 3.1. Initial Contribution per EU Country[81]

B. ECAP PERFORMANCE

ECAP's goal was to propose short and medium-term solutions in identified shortfalls, until the EU acquired the means to implement more concrete solutions in areas like Command and Control, EW and SEAD, Equipment Procurement, etc. This strategy led to 19 ECAP panels that in the end studied 24 out of the 42 shortfalls[82]. ECAP panels consisted of skilled personnel with expertise in relevant areas and were managed by one or more member states that proved highly motivated and determined to reach a positive outcome. The main framework for each panel was "to establish a common operational requirement, list all the means available and any projects in progress, identify potential areas of synergy, initiate or extend cooperation on future programs and come up with ideas for any type of joint qualitative or quantitative solution that would improve the capability deficit"[83]. However, a broader look in this subject, along with a comprehensive

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[81] Data from: CDI, Center for Defense Information, Military Reform Project, 11 September 2002, available at http://www.cdi.org/friendlyversion/printversion.cfm?documentID=199, accessed 5 May 2004.

[82] Ibid, RECOMMENDATION 741 article 46.

[83] Ibid., article 47.

analysis of the short falls identified in the Helsinki Catalogues, as well as the work of the ECAP panels have shown that overall improvement of the military and operational capabilities falls into the following three categories[84]:

- *Operational Concepts and Doctrines*: creating common concepts for the use of a task force. NATO's concepts and doctrines could be used as guidelines and adopted to the EU framework;

- *Training and Interoperability*: "blending" the national forces effectively through joint training of personnel and exercises at European level. Standardization of special equipments and systems' interoperability could account for smoother logistics and operational effectiveness;

- *Equipment Procurement*: EU could enhance its military position based on a long-term solution that will promote the acquisition of the necessary hardware. In this way, EU forces will be able to conduct and support military actions based on EU owned resources. In this area, Member States have a difficult task as they will have to commit to a budget within the financial limits necessitated by EU's Economic policy.

At the Capability Commitment Conference on 19 May 2003, the 19 panels presented their findings and addressed specific shortfalls that fall into the aforementioned categories. The first ECAP phase ended but the second phase has begun by taking a step further. The 19 panels transformed into 15 project groups with a task to implement identified solutions for the following shortfalls,[85] in a process that appointed different Member States as project coordinators.

1. Air-to-Air Refueling[86] (AAR) - Leading Nation: Spain[87]

The importance of AAF has been emphasized, especially after Air operations in Iraq, the Balkans, and Afghanistan. In these current war theatres, it was illustrated that a robust air-to-air refueling capability is crucial to maintain strike operations tempo and prevent enemy's mobility and reemergence[88].

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[84] Ibid., article 60.

[85] Ibid., article 49.

[86] Section information RECOMMENDATION 741, article 60 (a), unless specified otherwise.

[87] Burkard Schmit, European Capabilities Action Plan (ECAP), EU Institute for Security Studies

[88] Ripley, Tom, "Tankers in Demand" (Global Defense.Com, 2002). Available at http://www.global-defence.com/2002/air-refuel.html. accessed 29 March 2004.

However, the ratio of U.S. tanker aircraft compared to those of European Union members is approximately 10:1[89], which clearly shows EU's lack of resources. The high cost of air-to-air refuel tankers which range in price from $150-$175 million has pressed the project groups to search for alternate solutions. Germany, Sweden, Italy, and Spain have made the decision to convert existing transport aircraft into air-to-air refueling platforms. Britain, as another alternative, has considered renting rather than buying new refuelers to replace their aging fleet. They have proposed an $18.2 billion Future Strategic Tanker Aircraft (FSTA) program to provide air-to-air refueling service for the Royal Air Force starting in 2007.[90]

During the NATO Prague Summit in October of 2002, a group of European countries agreed to purchase a pool of 10 to 15 air-to-air refueling aircraft to increase their capabilities in this area.[91] These creative alternatives are temporary solutions that do not account for the future. As provisional solutions, the ECAP Project Group has suggested converting C130 aircraft and hiring civilian aircraft that can be transformed into tanker aircraft using a mobile kit system. However, as was also suggested, the EU in the end will have to be empowered with a multinational fleet of tanker aircraft and take the necessary steps to equip the A400M with this facility.

2. Combat Search and Rescue[92] (CSAR) - Leading Nation: Germany[93]

This area requires qualitative improvements according to the ECAP panels. The related Project Group examines the idea of creating a joint doctrine under NATO standards and then promoting joint exercises at the European level.

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[89] General Joseph Ralston, "Keeping NATO's Military Edge Intact in the 21st Century," (Brussels, speech given at the NATO/GMFUS Conference, 3 October 2002). Available at http://nato.int/docu/speech/2002/s021003d.htm, accessed 29 March 2004.

[90] Ripley, Tom, Ibid., pp. 1-3.

[91] Tim Garden and Charles Grant, "Europe Could Pack a Bigger Punch," Available at http://www.cer.org.uk/articles/grant_ft_17dec02.html, accessed 29 March 2004.

[92] Section information RECOMMENDATION 741, article 60 (b), unless specified otherwise.

[93] Burkard Schmit, Ibid.

3.   Strategic UAVs[94] - Leading Nation: France[95]

UAVs pose a difficult task for the ECAP Project Group as provisional solutions could not apply.   In addition, constraints related to technology and funding of this project create more delays in implementing the program.

4.   NBC Protection[96] - Leading Nation: Italy[97]

This protection is another area in which the ECAP Project Group has to act as a pioneer and develop an effective initial first forum for European.

5.   Headquarters[98] - Leading Nation: United Kingdom[99]

The ECAP Panel agreed that the member states must obtain an adequate number of national headquarters, namely:

- operations headquarters (at the strategic level in Europe);
- force headquarters (at a combined services level in the theatre);
- component headquarters (at the level of each service in the theatre).

However, the problem is to make these HQ multinational for the purpose of EU-led operations. Therefore, the ECAP project Group needs to:

- adopt procedures for "augmenting" the cores of the proposed headquarters to make them multinational;
- adopt operating procedures for those "European" headquarters;
- set up an exercise policy adapted to the different levels of headquarters;
- tackle as a priority the problem of the interoperability of command and information systems (CIS); the architecture for a European command and intelligence system also needs to be defined[100].

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[94] Section information RECOMMENDATION 741, article 60 (c), unless specified otherwise.

[95] Burkard Schmit, Ibid.

[96] Section information RECOMMENDATION 741 article 60 (d), unless specified otherwise.

[97] Burkard Schmit, Ibid.

[98] Section information RECOMMENDATION 741 article 60 (e), unless specified otherwise.

[99] Burkard Schmit, Ibid.

[100] Section information RECOMMENDATION 741 article 60 (e), unless specified otherwise.

6.   Special Operations Forces[101] - Leading Nation: Portugal[102]

This is an area with focus centered on drafting a doctrine and creating a flexible, mobile and interoperable unit.

7.   Theatre Ballistic Missile Defense[103] (TBMD) - Leading Nation: Netherlands[104]

The current deficit refers to TBMD systems that can be *deployed* at sea. The Project suggests partially fulfilling the need with the use of deployable ground-based systems until maritime TBMD systems become available.

8.   Strategic Airlift[105] - Leading Nation: Germany[106]

The lack of air transport and air-to-air refueling fleets among the Europeans limits, during the critical opening days of a mission, their ability to arrive at the area of operations on time. The majority of transport aircraft in the European's Air Forces are C-160 Transalls, which are a third smaller than the smallest U.S. transport employed, the C-130.[107]   Both types of aircraft are considered tactical inter-theater as opposed to the strategic intra-theater heavy lift platforms that would be more applicable to the Petersberg Task missions. These missions are typically outside of the EU member nations' traditional geographic boundaries where large carrying capabilities are needed to move forces and materials.

The EU nations have just four long-range strategic transports available, which are the C-17s leased on long-term contract by Britain to move their equipment to the fight.[108] This is in stark contrast to the 358 such type aircraft in

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[101] Section information RECOMMENDATION 741 article 60 (f), unless specified otherwise.

[102] Burkard Schmit, Ibid.

[103] Section information RECOMMENDATION 741 article 60 (g), unless specified otherwise.

[104] Burkard Schmit, Ibid.

[105] Section information RECOMMENDATION 741 article 60 (h), unless otherwise specified.

[106] Burkard Schmit, Ibid.

[107] Cailleteau, Francois "E plubuibus unum," in *The NATO Capabilities Gap and the European Union,* ed. David S. Yost, 101. Survival, vol. 42, no. 4, Winter 2000-01*,* The International Institute for Strategic Studies.

[108] Sloan, Elinor, "Military Matters, Speeding Deployment," NATO Review. (Autumn 2002): 5, available at http://www.nato.int/docu/review/2001/0101-10.htm, accessed 29 March 2004.

the U.S. strategic airlift fleet.[109] With no equivalent to the U.S. C-141, C-17 and C-5 aircraft outside of those leased by Britain for strategic lift, European partners must then depend on U.S. lift or they are forced to resort to the leasing of aircraft for specific operations. Both Germany and Britain were forced to arrange for leased aircraft during Operation Enduring Freedom, in order to support the International Security Assistance Force (ISAF) in Afghanistan and meet mission committments.[110]

The Europeans began addressing their strategic lift problem in June 2001 with the decision of Germany, Britain, France, Belgium, Spain, Turkey and Luxembourg to purchase 196 Airbus A400M aircraft. This number was revised down to a program launch of 180 aircraft in the spring of 2003, with first delivery expected in 2009.[111] The A400M cargo capacity of 81,000 lbs is comparable to the US C-141 cargo capacity of 68,000 lbs. While purchases of the A400M do not present an immediate solution, the European Union's commitment to address the strategic lift capability problem is clear.

9.   Interoperability[112] - Leading Nation: Belgium[113]

The Project Group has been specialized in studying interoperability between the European armed forces focusing on the very specific area of humanitarian aid and emergency evacuation operations.

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[109] US Air Mobility Command, "Air Mobility Command, Providing America's Global Reach," Available at http://www.transcom.mil/missions.amc.html, accessed 29 March 2004.

[110] Parliamentary Debates, Lords, 2 May 2002, Column 957W. Available at http://www.parliament.the-stationery-office.co.uk/pa/cm200102/cmhansrd/cm020502/text/20502w18.htm, accessed 29 March 2004.

[111] Airbus Military "A400 Project," Available at http://www.airbusmilitary.com/home.html. accessed 29 March 2004.

[112] RECOMMENDATION 741 article 60 (i)

[113] Janne Kuusela, Ministry of Defense of Finland, "Defense Policy in the EU: Is it necessary?," Work on Military Capabilities, available at http://www.soc.utu.fi/jean monnet/esp/European%20Security%20Complex/Kuusela_III.pdf, accessed 14 March 2004.

10. Space[114] - Leading Nation: France[115]

The Project Group has been exploring the following parameters:

- military utilization of space;

- the concept of space requirements for military operations;

- the purchase of hi-tech space capabilities through the joint development of demonstrators;

- the use of a European satellite system for a variety of purposes[116].

11. Intelligence, Surveillance, Target Acquisition and Reconnaissance[117] (ISTAR) – Leading Nation: Sweden and the United Kingdom[118]

The ISTAR Project Group has been appointed "to find ways of making good Europe's surveillance shortfalls by using AGS (Air Ground Surveillance) systems that rely on airborne radar equipment"[119]. It has been cooperating closely with a NATO *working* group. However, even though this task is crucial to military effectiveness, budget constraints and funding difficulties clearly shows that it is not feasible to implement that a solution in the near future.

12. Strategic Sealift[120] - Leading Nation: Greece[121]

ECAP'a solution in this area is to place charter contracts that under crisis will ensure access to civilian vessels, create a European *coordination* centre and introduce an appropriate sealift policy operating under EU responsibility.

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[114] RECOMMENDATION 741 article 60 (j).

[115] Janne Kuusela, Ibid.

[116] Particularly for network centric warfare.

[117] RECOMMENDATION 741 article 60 (k).

[118] Janne Kuusela, Ibid.

[119] Ibid., article 60 (k).

[120] Ibid., article 60 (l).

[121] Janne Kuusela, Ibid.

13. Collective Medical Protection[122] - Leading Nation: Netherlands[123]

Medical units in EU require both the acquisitions of new assets and the upgrade of existing recourses.

14. Attack Helicopters[124] - Leading Nation: Italy[125]

The recommendations of the ECAP Project stress interoperability and embrace the development of a joint doctrine, joint training and standardization of tactics and procedures.

15. Support Helicopters[126] - Leading Nation: Italy[127]

The Project Group has addressed the fact that current contributions cover only half of what is required. They propose short-, medium- and long-term solutions that include merging and joint funding programs that will enable member states to increase their contribution.

C. CAPABILITIES IMPROVEMENTS CHART 2004

A comprehensive analysis of the shortfalls identified in the Helsinki Catalogues and the ECAP panels show that capabilities improvements, once accomplished, will allow the EU to become more effective operationally and improve many of the following vital areas[128]:

- Command, Control and Intelligence
- Deployment to the Theatre of Operations and Air-to-Air Refueling
- Conduct and Support of Military Action in the Theatre of Operations
- Survivability of Deployed Forces
- Responsiveness and Level of Readiness of Forces

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[122] Ibid., article 60 (m).

[123] Janne Kuusela, Ibid.

[124] Ibid., article 60 (n).

[125] Janne Kuusela, Ibid.

[126] Ibid., article (o).

[127] Janne Kuusela, Ibid.

[128] Many of these areas are also addressed in RECOMMENDATION 741, article 51.

Therefore, in an effort to monitor progress, the Council receives a progress report on the EU's military capabilities every six months. More specifically,

> the report presented during each Presidency contains an ECAP "roadmap" aimed at monitoring ECAP progress and allowing Member States, if deemed necessary, to redirect the work of the project groups created under the ECAP to address identified

> shortfalls. This roadmap is accompanied by a "Capability Improvement Chart" including a state of play in the project groups.[129]

The latest published report, known as the Capability Improvement Chart 2004, shown in Table 3.2, monitors the current capability status. It takes into consideration the requirements identified in 2001, 2002, 2003 and 2004 as well as contributions from EU's newly come member states. The chart records Shortfalls and Deficits and shows their status in terms of progress. Once again, the aspect of the EW was not taken into consideration, although it is high beneficial to military personnel and contributes heavily to the success of any military operation.

ESDP : Capability Improvement Chart 2004					
Capabilities Shortfalls and Catalogue Deficits	Progress 2002-04	Impact	ECAP-Project Groups	Qualitative/Readiness Shortfalls	Projects and Initiatives
LAND					
Attack	≈	S	Attack Helicopters PG		YES
Army Aviation	≈			R	YES
Medium/Heavy Helicopter Transport	≈	S	Support Helicopters PG		YES
Reconnaissance and Liaison Helicopter	≈	S			YES

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129 Council of the European Union, Brussels, 13 May 2004, Capability Improvement Chart 2004, p. 1.

ESDP : Capability Improvement Chart 2004					
Capabilities Shortfalls and Catalogue Deficits	Progress 2002-04	Impact	ECAP-Project Groups	Qualitative/Readiness Shortfalls	Projects and Initiatives
Nuclear-Biological-Chemical Battalions	Solved	S	NBC PG		
Nuclear-Biological-Chemical Companies (balanced)	≈	S	NBC PG		
Logistic units	≈				
Surveillance and Target Acquisition Units /Unmanned Aerial Vehicles Battalions	≈	S			YES
Surveillance and Target Acquisition Units	≈	S			
Medical Collective Protection Unit Role 3	≈		Medical PG		YES
Deployable Laboratories	↗		NBC PG		YES
MARITIME					
Carrier Based Air Power	≈				YES
Helicopter Carrier	≈				
Primary Casualty Receiving Ship	≈		Medical PG		
Port and Shipping Advisory Team	≈				
Sea Ports of Disembarkation Units	−				
Amphibious Brigade Headquarters	≈			R	

AIR					
Air Operation Centre	Solved				
Suppression of Enemy Air Defense	≈	S			YES
Air to Air Refueling	≈	S	Air to Air Refueling PG		YES
Combat Search and Rescue	≈	S	Combat Search And Rescue PG		YES
Tactical Air Transport	≈				YES
Cruise Missiles and Precision Guided Munitions Equipped Aircraft	≈	S			YES
Air Support for Maritime Operations	Solved				
Disposed Operating Bases and Fire & Crash Support Element	≈				
Disposed Operating Bases Fuel distribution Support Element	≈				
Disposed Operating Bases Personnel Support Element	≈				
C3I – Command, Control, Communications and Information					
Operation Headquarters	↗	S	HQ ECAP-PG	Q	YES
Force Headquarters	≈	S		Q	YES

Land Component Commander Headquarters	≈	S		Q	YES
Maritime Component Commander Headquarters	≈	S		Q	YES
Air Component Commander Headquarters	≈	S		Q	
ISTAR – Intelligence, Surveillance, Target, Acquisition and Reconnaissance					
Imagery Intelligence Collection	≈	S	Space PG and PGs on ISTAR Framework and UAVs		YES
Signal Intelligence Collection	≈	S	ECAP-PGs on ISTAR Framework and UAVs		YES
Early Warning and Distant Detection Strategic Level	≈	S			YES
Theatre Surveillance and Reconnaissance Air Picture	≈	S			YES
Theatre Surveillance and Reconnaissance Ground Picture	≈	S			YES
STRATEGIC MOBILITY					
Strategic Airlift	≈	S	SAL PG	R	YES
Strategic Sealift (including Strategic Medical Evacuation)	≈	S	SSL ECAP-PG		YES
OTHER CAPABILITY					
Theatre Ballistic Missile Defense	≈	S	TBMD PG	Q	YES
CATALOGUE DEFICITS					
Force Headquarters Carrying Ship	≈				YES
Repair Support Ship	≈				

Amphibious Ship	≈			R	YES
Patrol Vessels / Fast Ships	Solved				
Harbor & Shallow Water Mine Counter-Measure Ships	≈				
Carrier Based Reconnaissance Pods	≈				YES
Division Headquarters	≈			R	
Light Infantry Brigade Headquarters	≈				YES
Light/Medium Armored Squadrons	≈				YES
Mechanized Infantry Battalions	↗			R	YES
Light Infantry Battalions	≈				YES
Amphibious Infantry Battalion	≈			R	
Field Artillery Battalion (Amphibious)	≈			R	
Short Range Air Defense Battalion	≈			R	YES
Grand Based Air Defense Medium Level Battalion	≈			R	YES
Grand Based Air Defense Battery	Solved			R	
Grand Based Air Defense Battery (Amphibious)	≈			R	
Combat Engineer Battalion (Amphibious)	≈			R	
General Support Engineer Battalions	≈				

General Maintenance Engineer Battalions	≈	S			
Reconnaissance Squadron (Amphibious)	≈			R	
Medical Treatment Facilities Role 3 (including In-Theatre ashore and afloat Medical Treatment Facilities)	Solved		Medical PG	R	
Military Specialized Unit Battalion	≈				
Forward Tactical Aeromedical Evacuation Helos	Solved			R	

LEGENDS	
Solved	Shortfall/Deficit solved
↗	Situation has improved
≈	Situation remains approximately the same
S	In HPC 2001 identified as significant in the assessment of capability
PG	Project

Table 3.2   Capability Improvement Chart 2004[130]

D.   TASKS AND DEPLOYMENTS UNDER ESDP

EU's military capabilities were put to test with the execution of two virtual and four actual missions. The chronology of events shows that the EU Military Staff (EUMS) was declared operational on 11 June 2001, and was based in Brussels. Director-General Lt. Gen. Rainer Schuwirth of Germany was the head of the Military Staff. His deputy, and chief of staff, was British Maj. Gen. Graham Messervy-Whiting and the staff initially had the strength of 140 people[131]. Furthermore, the EU launched an exercise program that covered the period

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[130] Table from the Council of the European Union, Brussels, 13 May 2004, Ibid.

[131] Military Reform Project, Center of Defense Information (CDI), 11 September 2002, available at http://www.cdi.org/friendlyversion/printversion.cfm?documentID=199, accessed 17 March 2004.

2001-2006, with a sequence of exercises designed to ensure appropriate readiness and efficient function in a crisis management situation. The exercises were designed to ensure the EU structures, procedures, including consultation with the UN, and arrangements were properly tested and validated in order to ensure the appropriate results in a Petersberg task-type crisis[132].

As a result, the first ESDP exercise entitled CME02 (Crisis Management Exercise 2002) under the scenario 'Save Atlantia', a virtual island in the ocean where Europeans are entrusted with the task of ensuring peace, took place on 22-28 May 2002, not in the battlefield, but on paper[133]. The purpose of the exercise was to test the Union's decision-making mechanisms in a crisis situation. "CME02 clearly demonstrated that more efficient Crisis Management Procedures would be required and ignored many critical aspects of any possible mission; the most important of these, according to the Foreign Office, was the humanitarian situation on the ground"[134]. In any actual crisis, interaction with the

key humanitarian agencies on the ground will be of utmost importance. In addition, a large-scale EU terrorist attack simulation was organized (EURATOX 2002) on 27-28 October 2002[135] in order to test civil protection capabilities.

However, in 2003, the EU finally engaged in three missions, those in *Bosnia-Herzegovina*, the *Former Yugoslav Republic of Macedonia* and the *Democratic Republic of Congo*, performing a variety of tasks, from law enforcement and ceasefire monitoring to security and humanitarian crisis management. The military operations were important test cases for the Union's ability to apply some of the military policy instruments it envisioned under the

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[132] Annual Report, available at http://www.danboyle.ie/resources.php?id=5&pid=5, accessed 7 April 2004.

[133] EU/Terror, available at http://www.minpolitik.dk/visnyhed.php?action=info&id=1014&med=, accessed 14 March 2004.

[134] House of Lords, Session 2002-3, 7th Report, Select Committee on the EU, "EU-Effective in a Crisis?," 11 February 2003, Published by the authority of the House of Lords, Box 3, Lessons Learned from CME02, p. 17.

[135] European Security and Defense Policy, available at http://www.eurunion.org/legislat/Defense/esdpweb.htm, accessed 10 April 2004.

Helsinki Headline Goal 2003. These engagements were the first concrete demonstration of the EU's security and defense dimension, which could lead to more ambitious interventions within and beyond the European periphery.

1. European Union Police Mission in Bosnia-Herzegovina

Launched on 1 January 2003, the *European Union Police Mission* (EUPM[136]) in Bosnia-Herzegovina[137] represented the EU's first-ever civilian crisis management operation under ESDP. Taking over from the United Nations' International Police Task Force (IPTF), which had been in place since December 1995, the operation aimed to establish local law enforcement capabilities that could contribute to the stability of the region. The EUPM took a mandate for three years (until 31 December 2005) and an annual budget of €38 million, with €20 million financed from the Community budget[138]. A force of 537 police officers, approximately 80 percent from EU member states and 20 percent from third states, has been sent to perform monitoring, mentoring and inspection activities[139]. The police officers are supported by 400 support staff. The EUPM, whose headquarters are located in Sarajevo, are divided in three departments, namely Operations, Planning and Development, as well as Administration and Support Services. Table 3.3 summarizes the countries and their contribution to this mission.

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[136] EUPM was based on a Council decision from 11 March 2002, following the United Nations Security Council's endorsement (Resolution 1396 of 5 March 2002) of an EU engagement. On 4 October 2002, the EU signed an agreement with the Bosnian authorities that defined the conditions and terms of the EUPM, Ibid.

[137] EU statement on the launch of the EU Police Mission (EUPM) in Bosnia and Herzegovina, Permanent Council No. 431, 16 January 2003, available at http://europa.eu.int/comm/external_relations/osce/stment/eupm160103.htm, accessed 2 March 2004.

[138] Dov Lynch and Antonio Missiroli, "ESDP Operations," EU Institute of Security Studies, available at http://www.iss-eu.org/esdp/09-dvl-am.pdf, accessed 2 March 2004.

[139] Ibid.

EU MEMBER STATES		THIRD STATES	
COUNTRY	TOTAL	COUNTRY	TOTAL
AUSTRIA	7	BULGARIA	3
BELGIUM	10	CANADA	6
DENMARK	14	CYPRUS	4
FINLAND	23	CZECH REPUBLIC	6
FRANCE	85	ESTONIA	2
GERMANY	83	HUNGARY	5
GREECE	11	ICELAND	3
IRELAND	5	LATVIA	1
ITALY	47	LITHUANIA	2
LUXEMBOURG	3	NORWAY	8
NETHERLANDS	37	POLAND	12
PORTUGAL	10	ROMANIA	9
SPAIN	22	RUSSIA	5
SWEDEN	15	SLOVAKIA	4
UNITED KINGDOM	70	SLOVENIA	4
		SWITZERLAND	4
		TURKEY	12
		UKRAINE	5
TOTAL	442	TOTAL	95

Table 3.3.   Deployment of Police Officers (EUPM), 24 April 2003 in Bosnia-Herzegovina[140].

The Danish Commander, Sven Frederiksen, was appointed Police Commissioner of the operation. He had to work in close coordination with the Union's (and UN) Special Representative in Bosnia and Herzegovina, Lord Ashdown. Since 1 March 2004, Assistant Commissioner Kevin Carty, succeeding the late Sven Frederiksen, who died on 26 January 2004, has led the Mission[141]. Lord Ashdown remains as the Special Representative in Bosnia and Herzegovina and reports to the Council through the EU High Representative for the CFSP, Javier Solana[142]. The latest news concerning this mission was reported in the 17-18 June 2004 Presidency Conclusions as follows: "the European Council adopted a comprehensive policy towards Bosnia and

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[140] Data from Ibid.

[141] The Council of the European Union, available at http://ue.eu.int/cms3_fo/showPage.asp?id=585&lang=EN, accessed 24 April 2004.

[142] EU and UN, EU Presidency Statement, available at http://europa-eu-un.org/article.asp?id=2876, accessed 4 June 2004.

Herzegovina setting out practical arrangements to enhance the coherence and effectiveness of the EU's engagement in support of the European perspective of the country[143]".

2.   Operation "Concordia" and Operation "Proxima" in FYROM

On 31 March 2003, the EU launched the *Concordia* mission in the Former Yugoslav Republic of Macedonia (FYROM), its first-ever military operation. EU forces took over NATO's *Operation Allied Harmony or "Amber Fox"* with a goal of contributing further to a stable, secure environment in the FYROM and ensure the implementation of the August 2001 Ohrid Framework Agreement[144]. The EU force, within which France has initially acted as 'framework' nation, was instructed to patrol the ethnic Albanian-populated regions of FYROM that border Albania, Serbia and Kosovo. Thirteen EU member states, except for Ireland and Denmark, and 14 non-member states have contributed forces to the mission, for a total of 357 lightly armed military personnel. Table 3.4 summarizes the countries and their contribution to this mission.

EU MEMBER STATES		THIRD STATES	
COUNTRY	TOTAL	COUNTRY	TOTAL
AUSTRIA	11	BULGARIA	2
BELGIUM	26	CANADA	1
FINLAND	9	CZECH REPUBLIC	2
FRANCE	145	ESTONIA	1
GERMANY	26	HUNGARY	2
GREECE	21	ICELAND	1
ITALY	27	LITHUANIA	1
LUXEMBOURG	1	NORWAY	5
NETHERLANDS	3	POLAND	17
PORTUGAL	6	ROMANIA	3
SPAIN	16	LATVIA	2
SWEDEN	14	SLOVAKIA	1

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[143] Presidency Conclusions, Brussels, 17 and 18 June 2004, available at http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/ec/81035.pdf, accessed 4 June 2004.

[144] The political accord which settled the mounting conflict between Macedonian Slavs and Albanians.

EU MEMBER STATES		THIRD STATES	
COUNTRY	TOTAL	COUNTRY	TOTAL
UNITED KINGDOM	3	SLOVENIA	1
		TURKEY	10
TOTAL	308	TOTAL	49

Table 3.4.   Deployment of EU Force in FYROM[145]

The operation, requested by FYROM's President Trajkovski and based on United Nations Security Council Resolution 1371, was expected to last six months and it initial budget was € 6.2 million. While *Concordia* constituted an EU-led mission, the Union relied on NATO assets and capabilities under the 'Berlin-plus' arrangement. The EU Operation Headquarters were located at the Supreme Headquarter Allied Powers in Europe (SHAPE) in Belgium. Deputy SACEUR, Admiral Rainer Feist (Germany), had been appointed Operation Commander while General Pierre Maral (France) held the position of Force Commander on the ground until 1 October, before handing over its authorities, following a Council decision, on 21 July 2003, to extend the mandate until 15 December 2003, to Major General Luis Nelson Ferreira Dos Santos (Portugal) from EUROFOR. They had all worked in close coordination with the EU's Special Representative in FYROM, the Belgian diplomat Alexis Brouhns. Therefore, the Operation Concordia in FYROM also represented the first test case for the strategic EU-NATO partnership for crisis management that put into effect the long-awaited bilateral 'Berlin-plus' agreement of December 2002[146].

Finally, *Concordia* had been succeeded by an EU Police Operation (EUPOL) also run by the EU. *Proxima,* as the 200-strong EUPOL is called, was launched on 15 December 2003 on the basis of a Joint Action adopted by the General Affairs and External Relations Council held on 29 September 2003. It followed an invitation from Branko Crvenkovski, FYROM's Prime Minister, to the EU through High Representative (HR) Javier Solana. *Proxima,* aimed to help

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[145] Dov Lynch and Antonio Missiroli, Ibid.

[146] Ibid.

FYROM authorities develop their police forces according to European and international standards and focused, in particular, on supporting the government's efforts to fight organized crime. The total cost of the mission was € 15 million for the first year, including start-up costs of € 7.5 million, all funded through the EU budget[147].

3. Operation 'Artemis' (Democratic Republic of Congo)

With the aim of preventing a large-scale humanitarian and civil crisis in Ituri, a region in the North-East of the Democratic Republic of Congo (DRC), the EU responded to an appeal by the United Nations Secretary General Kiofi Annan and launched a military operation on 12 June 2003[148]. In accordance with the mandate specified in UN Security Council Resolution 1484 (30 May 2003), the *Artemis* mission sought to contribute to the stabilization of security conditions and the improvement of the humanitarian situation in Bunia, the Ituri capital. The multinational force was mandated to protect camps of internally displaced persons, secure the Bunia airport as well as ensure the safety of the civilian population, UN personnel and the wider humanitarian presence. The force encompassed about 1,800 soldiers, mostly French[149].

The operation ended on 1 September 2003. The last elements of the force left Bunia on 6 September, after returning full responsibility to the UN mission (MONUC), now provided with a wider mandate, more robust rules of engagement, and an 18,000-strong multinational force. France was, once again, the 'framework' nation for the *Artemis* mission: Major General Neveux was appointed EU Operation Commander and Brigadier General Thonier EU Force Commander. Both worked in close coordination with the EU's Special Representative in the region, the Italian Aldo Ajello. The Planning Headquarters were located at the Centre de Planification et de Conduite des Opérations (CPCO) near Paris, France, the Operational Headquarters in Entebbe, Uganda,

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147 Ibid.

148 Ibid.

149 Ibid.

with an outpost in Bunia. In addition to France, the United Kingdom and Sweden contributed combat troops. Belgium and Germany provided non-combat forces, while non-EU contributors include Canada, South Africa and Brazil[150].

Artemis was the EU's first military operation outside Europe and, unlike the other two missions, did not rely on NATO assistance. Although limited in time and scope, Artemis was an undeniable success from a military point of view. The military intervention was prepared in a very short period of time, involving all the EU members in the decision making process regarding planning and rules of engagement. Cooperation on the ground between participating nations, especially France and Sweden, was efficient. Beyond military intervention, the EU decided on a three–pronged strategy for Ituri: first, to help disarm, demobilize, and reintegrate armed groups, particularly children; second, to prepare a socio-economic rehabilitation program; and third, to give an immediate € 200 million aid package from its European Development Fund (EDF) in order to create an ethnically mixed police force[151].

Talks are still under way regarding the possibility of the EU launching a police mission in the Democratic Republic of Congo in order to assist the interim government in Kinshasa in creating a countrywide police force. At the 17-18 June 2004 Presidency Conclusions, the EU stated its deep concern about the situation in Congo and urged Congo's neighboring countries to support the peace process and concluded by stating that "EU stands ready to support these countries in these efforts[152]".

E.   LESSONS LEARNED

Major General Jean-Pierre Herreweghe, Deputy Director General and Chief of Staff, Council of the European Union, in an effort to draw useful feedback from operations Concordia and Artemis missions stated that:

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[150] Ibid.

[151] Jean-Yves Haine, "ESDP: an Overview," Institute of Security Studies, available at http://www.iss-eu.org/esdp/01-jyh.pdf, accessed 7 April 2004.

[152] 17/18 June 2004 Presidency Conclusions.

- both missions have been successful

- the EU can react rapidly and autonomously at long distances from Brussels

- more "strategic lift capacity" is needed

- communications between HQs and staffs must be improved

- political decisions should be implemented in the field, e.g. no reserve troops were provided despite an agreement at the political level[153]

In addition, Dr. Alexandra Novosseloff, Desk Officer for NATO, Délégationaux Affaires Stratégiques, French Defence Ministry, stated that:

- Concordia and Artemis proved that the ESDP is operational, even if they were both limited in scope

- both were launched in order to prove ESDP's operational status

- they proved that ESDP works even when the CFSP has limitations, as they were launched during the Iraq crisis

- both operations involved the concept of the 'framework nation' – an old practice previously deployed in Rwanda, Haiti, Afghanistan and elsewhere. The UN recognizes that this is the most appropriate tool for peace enforcement.

- Both missions demonstrated:

  - the EU's rapid reaction capability

  - excellent co-operation with the UN

  - the EU's willingness to get involved with crisis management[154]

Overall, the EU demonstrated, under the ESDP status, not only that it can become a useful tool of crisis management in the Balkans, but also an international actor promoting the idea of multilateralism. The European Security and Defense Policy also proved adequate enough to support, in its early steps, different type of missions, although many areas are still under development.

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[153] New Defense Agenda - Working Group 'A' Meeting – 29 September 2003, available at http://www.forum-europe.com/publication/SOD_29_September_2003withparticipantslist.pdf, accessed 2 April 2004.

[154] New Defense Agenda, Ibid.

F.   FUTURE GOALS

The formation of ESDP allowed the EU to create an active military framework and become a potential actor in responding to international crises and assisting UN requests. The EU showed determination in introducing effective instruments to implement the Petersberg Tasks. Moreover, with a successful beginning and an on going development process, the Member States have chosen to set a new Headline Goal, "reflecting the European Security Strategy, the evolution of the strategic environment and of technology"[155]. This time, the EU member states have decided to "commit themselves to be able *by 2010 to respond with rapid and decisive action applying a fully coherent approach to the whole spectrum of crisis management operations covered by the treaty on the European Union*"[156]. The EU's readiness is to be expanded in the area of "joint disarmament operations, the support for third countries in combating terrorism and security sector reform"[157].

Furthermore, taken into consideration the existing shortfalls, deficits and the feedback acquired from the initial operations, the Union addressed the need for forces that "are more flexible, mobile and interoperable"[158]. As a result, there has been already an agreement among member states for the creation of a new military unit, called the Battle Groups, which seeks to become a key instrument in the new EU military planning. Battle Groups will have the size of a battalion, around 1,500 highly trained soldiers. The units

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[155] Headline Goal 2010, available at
http://ue.eu.int/uedocs/cmsUpload/2010%20Headlines%20goals.pdf, accessed 15 June 2004.

[156] Ibid., p. 1.

[157] Ibid.

[158] Headline Goal 2010, Ibid.

should be available within 15 days notice and sustainable for at least 30 days (extendable to 120 days by rotation) They should be flexible enough to promptly undertake operations in distant crises areas (i.e. failing states), under, but not exclusively, a UN mandate, and to conduct combat missions in an extremely hostile environment (mountains, desert, jungle, etc).[159]

Member states are to start contributing to these multinational "high readiness joint packages" at the beginning of the second semester of 2004. The rapidly deployable Battle Groups are supposed to be completed in 2007[160]. The ultimate aim is for EU "to be able to take the decision to launch an operation within 5 days of the approval of the Crisis Management Concept by the Council with the ambition that the forces start implementing on the ground, no later than 10 days after the EU decision to launch the operation"[161].

As a result, the Member States have identified the following milestones that need to be implemented by 2010:

- as early as possible in 2004, …the formation of a civil-military cell[162] within the EUMS that will have the ability to set-up rapidly an operation centre for a particular mission;

- the establishment of the Agency in the field of defense capability development, research, acquisition and armaments (European Defense Agency) in the course of 2004;

- the implementation by 2005 of EU Strategic lift joint coordination, with a view to achieving by 2010 necessary capacity and full efficiency in strategic lift (air, land and sea) in support of anticipated operations;

- the transformation of the EACC into the EAC by 2004 is accepted, in an effort to develop a European Airlift command fully efficient by 2010;

- the complete development by 2007 of rapidly deployable battle-groups[163] including the identification of appropriate strategic lift, sustainability and debarkation assets;

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[159] "EU Defense Ministers Admit Global Responsibility," available at http://euobserver.com/?aid=16141&rk=1, accessed 17 May 2004.

[160] Ibid.

[161] Ibid.

[162] Plan to be established within 2004.

- the availability of an aircraft carrier with its associated air wing and escort by 2008;

- the development of appropriate compatibility and network linkage of all communications equipment and assets both terrestrial and space based by 2010;

- and finally the development of quantitative benchmarks and criteria that national forces declared to the Headline Goal have to meet in the field of deploy-ability and in the field of multinational training[164].

In the Brussels European Council 17-18 June 2004 Presidency Conclusions, the European Council among others decided the following:

> The European Council endorses the Headline Goal 2010. The European Council also endorses the Action Plan for Civilian Crisis Management and welcomes the steps taken to further improve EU capacity to undertake military rapid response operations for crisis management. It also endorses the elaboration of modalities under which the EU could provide military capabilities in support of the United Nations.

The Council also referred to the on-going missions in FYROM and Bosnia-Herzegovina as a success and welcomed the progress made in the first EU Rule of Law mission under ESDP, which is to start shortly in Georgia. In addition, the Council included in the conclusions a section named "Specific Situation of Concern" involving countries, (i.e., Sudan, Iran and the Democratic Republic of Congo), that face or could initiate an international crisis, if the existing core problems pointed out by the council are not monitored properly. Based on the Conflict Cycle analyzed below, EU's involvement in these cases could result in medium or high intensity conflicts, the kind of encounter that requires careful planning and advance military capabilities.

G. THE CONFLICT CYCLE

The HGs 2010 initiate ESDP's second phase of development. During the first phase, EU led forces were able to manage, based on Figure 3.1, Positive

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[163] Recall from Chapter II that Battle Groups are supposed to be completed in 2007. Member states are to start contributing to these multinational "high readiness joint packages" at the beginning of the second semester of 2004. It seems so far, that Battle groups are able to restore the shortfalls in major areas.

[164] Headline Goal 2010, Ibid., p. 2.

Peace, Negative Peace, Tension, Crisis and Low Intensity Conflicts. These tasks, however, remained limited in scope and depended heavily on resources obtained from key EU member states. Nevertheless, operation Concordia illustrated the effectiveness of the "Berlin-Plus agreement"[165] under which NATO resources were shared for the common good. NATO's readiness, as shown in Figure 3.1, embraces a wider spectrum of conflicts. With the unique contribution of U.S. resources and technological know-how, NATO has the knack to operate autonomously in any part of the world. Missions in Kosovo, Afghanistan and Iraq are recent examples of NATO's response to an international crisis.

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[165] More information available at http://www.nato.int/shape/news/2003/shape_eu/se030822a.htm, accessed 29 March 2004.

Conflict Cycle

Conflict Evolution

High Intensity Conflict

War

Medium Intensity Conflict

Forceful military intervention

Low Intensity Conflict

Limited military intervention

Crisis

Extremist movements
Lost of government authority
Threat of foreign intervention

Tension

General strikes
Disruption of normal
activities of institutions

Negative Peace

Social unrest
Political instability
Economic disease

Positive Peace

Stability of institutions
Social Order
Normal economic activity

Cessation of Hostilities

Peace Talks

Peace Enforcement

Sanction
Peace Building

Peace Keeping

Elections Assistance

Disarmament

Authority restoring

Reconstruction
Police
Justice

Return to normality

NATO

OSCE

European Union (ESDP)

EAPC-PfP

Time

Figure 3.1.   Conflict Cycle[166]

[166] Table from: Alfredo Chamorro Chapinal, LT General of the S.A.F. (Res), NATO Fellowship Holder, "The Security and Defense of Europe in the Twenty First Century (NATO, WEU, OSCE)," Final Report, Madrid, May 2000, p. 115, available at www.nato.int/acad/fellow/98-00/chamorro.pdf, accessed 14 March 2004.

The EU, on the other hand, has taken significant steps towards becoming a liable international actor. Motivation in this direction is high and the fact that the UN has requested the EU's assistance with operation Artemis has shown that it considers the EU a capable force. The EU, in this case, acted on time and troops were on the ground within a week, as the Council approved the Congo operation without delay. However, in high intensity conflicts, i.e., Iraq, the EU failed to establish a common position among member states.

The world today has entered an era of continuous violence and the fact is that no organization has all the necessary recourses available to support the current global situation. As shown in Figure 3.1, medium and high intensity conflicts, characterized by forceful military intervention and war respectively, are at this point beyond the EU's capabilities without proper NATO assistance. If the Headline Goals 2010 are to be implemented, the EU be able to act autonomously when entering medium or high intensity conflicts. An area that will enhance EU's military autonomy is the development of an Electronic Warfare (EW) unit based on NATO's standards.[167]. Although EW has been addressed as an area of importance, such as the Gulf war and the Kosovo air campaign, none of the existing ECAP panels have tackled the issue in terms of a project. EW is an important function in all types of conflicts during the preparation, planning, and execution phases. It is also very critical with respect to interoperability in coalition operations. The following chapters emphasize the need to focus on EW as a military and critical asset for the implementation of the Petersberg tasks, the autonomy and overall performance of the European forces, and the assistance of allied organizations.

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[167] A variety of proven taxonomies exist for listing military functions, capabilities and technology areas such as the taxonomy used in the Science and Technology (SCITEC) Study, by Western European Armaments Group (WEAG), military functions based on NATO MC 299/3 TNO Physics and Electronics Laboratory, p. 47, Ibid.

IV. ELECTRONIC WARFARE AS A CRITICAL ASPECT FOR THE OPERATIONAL EFFECTIVENESS OF THE ESDP AND THE EU RAPID REACTION FORCE

Military operations are executed in an increasingly complex electromagnetic (EM) environment. Today, both civilian and military organizations, for communications, navigation, sensing, information storage, and processing, as well as for a variety of other purposes, use EM devices. The increasing portability and affordability of sophisticated EM equipment guarantees that the electromagnetic environment in which military forces operate will become more complex in the future. The recognized need for military forces to have unconstrained access using the electromagnetic environment creates vulnerabilities and opportunities for EW in the support of military operations. In Joint operations, such as ESDP's Rapid Reaction Force (RRF) future operations, EW is one of the integrated capabilities used to conduct information operations (IO)[168].

For this reason, the EW remains one of the most critical civilian, military and technological assets for the improvement of the common ESDP and the RRF. Moreover, today, EW is viewed not only as a defense but also as an attack mechanism. This chapter highlights the importance of EW in military operations and introduces the Improved Many on Many (IMOM) model which is a battle tested Air Force Computer simulation of EW effects. A description of the basic IMOM functions follow in order to appreciate the potential of the appropriate IMOM tools in support of operational planning. Moreover, Chapter V provides an illustration of the model in an imaginary scenario under the name "Save Atlantia 2008". Nevertheless, in order to understand better the concept of EW, some of the definitions extant in the literature need addressing.

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[168] Joint Publication 3-51, "Joint Doctrine for EW," 7 April 2000, doctrine prepared for the U.S. Joint Chief of Staff, p. 1-1.

A.   EW: DEFINITIONS

There are many views and definitions emphasizing the importance of EW in the military environment. According to D. Curtis Schleher,

> EW is a military action whose objective is to control EM spectrum. To accomplice this objective both offensive *electronic attack* (EA) and defensive *electronic protections* (EP) are required. In addition, *electronic warfare support* (ES) actions are necessary to supply the intelligence and threat recognition that allow implementation of both EA and EP[169].

In order to understand the military terminology and EW's main components, D. Curtis Schleher provides the following in Figure 4.1:

EW
Any military action involving the use
of electromagnetic and directed energy
to control the electromagnetic spectrum or to attack the enemy.
The three major subdivisions are Electronic Attack (EA),
Electronic Protection (EP), Electronic Warfare Support (ES)

EA
That division of electronic warfare involving the use of electromagnetic or directed energy to attack personnel, facilities or equipment with the intent of degrading, denaturing or destroying enemy combat capability.

EP
That division of electronic warfare involving actions taken to protect personnel, facilities and equipment from any effects of friendly or enemy employment of electronic warfare that degrade, neutralize or destroy friendly combat capability.

ES
That division of electronic warfare involving actions tasked by or under direct control of, and operational commander to search for, intercept, identify and locate sources of intentional and unintentional radiated electromagnetic energy.

Figure 4.1.   EW Terminology[170]

However, a broader view of EW is that of Antony E. Spezio, who states:

> EW is an important capability that can advance desired military, diplomatic, and economic objectives or, conversely, impede undesired ones. …. In a military application, EW provides the means to counter, in all battle phases, hostile actions that involve the EM spectrum-from the beginning when enemy forces are mobilized for an attack, through to the final engagement[171].

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[169] D. Curtis Schleher, "*Electronic Warfare in the Information Age,*" Artech House, 1999, p. xi.

[170] Ibid., p .2-2.

[171] Antony E. Spezio, "Electronic Warfare Systems," Invited Paper, IEEE Transactions on Microwave Theory and Techniques, Vol. 50, No. 3, March 2002, p. 633.

Another definition is that of Filippo Neri:

The techniques and technologies that lead to the constructions of devices capable of electronically countering a weapon system, and to the development of counter-countermeasures go under the name EW.[172]

Finally, the U.S. Joint Doctrine for EW explains:

In military operations, the term EW refers to any military action involving the use of electromagnetic or directed energy to control the EM spectrum or to attack the enemy[173].

B.   ELECTRONIC WARFARE AS A SIGNIFICANT COMPONENT OF "COMMAND AND CONTROL"

Command and control systems (C2) allow military leaders to improve and substantiate their decision-making. In this area, EW is a critical aspect and "fits well in the current revolution in military affairs"[174]. In today's battlefields, a key goal is to produce confusion and to disorient an enemy commander from his forces. This function involves well-trained personnel and sophisticated techniques supported by EW systems. ESDP has addressed the importance of Command and Control but has not followed NATO's footsteps in the area of relating this function with EW.

As discussed further in Chapter VI, NATO has implemented the concept of EW since 1966, the year in which the Electronic Warfare Advisory Committee (NEWAC) was established. According to NATO's handbook, NEWAC was created

to support the military committee, the NATO Strategic Commanders and the nations by acting as a joint, multinational body to promote an effective NATO EW capability. It monitors progress achieved nationally and within the Integrated Military Command Structure in

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[172] Filippo Neri, "*Introduction to Electronic Defense Systems,*" Second Edition, Artech House, 2001, p. 3.

[173] Ibid., Joint Publication 3-51, p. vii.

[174] Ibid. Schleher, p. xi.

implementing agreed EW measures. It is responsible for the development of NATO's EW policy, doctrine, operations and educational requirements and contributes to the development of command and control concepts[175].

Following NATO's steps, ESDP needs to address this issue and incorporate effectively EW's three main pillars including:

- *Electronic Attack* (EA) is used for Electronic Countermeasures (ECM). This pillar utilizes electromagnetic energy weapons. *Hard Kill Weapons*: anti-radiation missiles, electronic jamming/deception. *Soft Kill Weapons*: jammers, or directed energy weapons to attack personnel, facilities, or equipment in the interest of degrading, neutralizing, or destroying combat capability.

- *Electronic Protection* (EP) is used for Electronic Counter-Countermeasures (ECCM). EP is any action taken to protect personnel, facilities, and equipment from any effects of friendly or enemy employment of EW. Such an example could be the de-confliction of assigned communications frequencies and clearance for jamming activities.

- *Electronic Warfare Support* (ES) is used for Electronic Support Measures (ESM). ES are any actions to provide information required for immediate decisions involving EW operations, threat avoidance, targeting, and homing. An example could be an aircraft (EP-3) monitoring an enemy's communications network to identify which nodes appear to be critical and the value each nodes adds to their assigned network.

In addition, Electronic Warfare (EW) has also many sub-divisions, mainly related with offense, support and defense, as shown in Table 4.1.

OFFENSIVE EW	SUPPORTIVE EW	DEFENSIVE EW

Electronic Attack (EA)
■ Non–Destructive
  o Electromagnetic Suppression
  o Electromagnetic Deception
  o Directed Energy
■ Destructive
  o Anti-Radiation Missiles
Directed Energy
	EW Support (ES)
	■ Threat Warning and Recognition
	■ Collection Supporting EW
	■ Direction Finding
		Electronic Protection (EP)
		■ Protect from Friendly EW
		  o Emission Control
		  o EW Frequency Deconfliction
		■ Protect from Enemy EW
		  o Emission Control
		  o Electromagnetic Hardening

Table 4.1.   EW Sub-Divisions[176]

[175] NATO Handbook, NATO office of Information and Press, 2001, p. 324.

[176] Data from: Schleher, Ibid., pp. 6-10.

1.   Electronic Warfare and Air Operations

Electronic Warfare (EW) has been an important component of military air operations since the earliest days of radar. Radar, EW, and stealth techniques have involved over time as engineers, scientists, and tacticians have struggled to create the most survival and effective joint force possible. Several recent events suggest that airborne EW merits congressional or constitutional attention. Operation Allied Forces, the 1999 NATO operation in Yugoslavia, and the recent wars against terrorism, appear to have marked an important watershed in the debate over current and future EU or U.S. airborne EW.

Especially for the United States, it appears that every strike on Serbian or Iraqis targets was protected by radar jamming and/or SEAD aircraft. Electronic countermeasures self protection systems, such as towed radar decoys, were credited with saving numerous NATO or U.S. aircraft that have been targeted by Serbian or Iraqi surface-to-air missiles (SAMs). The U.S. Defense is engaged in numerous activities, such as research and development (R&D) programs, procurement programs, training, experimentation that are designed to improve various electronic attack (EA), ECM, and SEAD capabilities both in the near and long term.

The EU, however, does not demonstrate the same enthusiasm concerning these activities. They often cut across bureaucratic boundaries and budget cuttings, which makes it difficult to determine and access DoD-wide EW priorities. Often, it appears that every European Union DoD or the ESDP has no single, coherent plan for coordinating all these efforts or setting priorities. As it seems so far, the EU parliament disagreed with many of these plans by rejecting budget requests, and reduced or constrained some programs accordingly[177].

Nevertheless, in order to maintain the HHG 2003, the Headline Goal 2010 was created as a temporary solution as well as a smaller and more effective force, the EU seven- to- nine Battle Groups, consisting of 1500 well-equipment

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[177] Dr. Frank Umbah, "The Future of the ESDP," Repots and Analyses 20/03, Center for International Relations, 6 September 2003, available at www.csm.org.pl/pl/files/rap_i_an_2003.pdf. accessed 29 March 2004.

men. It remains to be seen whether these new Headline Goals and the mobilized forces will realize the significance of EW. The following paragraphs offer a brief description of a software tool, the IMOM Model, designed to help the planning and the decision making process and maximize the level of success in an air attack scenario.

C.   IMOM MODEL

The Improved Many-on-Many (IMOM) model is a computer software program simulating Electronic Warfare effects. IMOM was originally developed at the 453rd Electronic Warfare Squadron (EWS) at the U.S. Air Force Information Warfare Center (AFIWC). In 1989, it became a part of a project initiated by the U.S. Air Force Electronic Warfare Center (AFEWC) and the Idaho National Engineering and Environmental Laboratory (INEEL). Using modern software engineering paradigms, (INEEL) has re-engineered the software, as shown in Figure 4.2, to execute in heterogeneous environments. The result is a fast, efficient model that provides detailed detection information studies and analysis for numerous field users. The AFIWC IMOM [Improved Many (radars)-On - Many (jammers)], is presently in use by the U.S. Air Force to model the Electronic Order of Battle (EOB) for pilots on operational missions[178].

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[178] INEEL, Need to Know, A National Security Newsletter, "Evolution of a Program- The Electronic Combat System Integration," Volume 1, Number 4, July 2001, available at http://www.inel.gov/nationalsecurity/newsletter/jul2001.pdf, accessed 29 March 2004.

Figure 4.2.   IMOM Model, Version 6.6

This thesis verified the IMOM results against the basic Radar Range Equation. Particular attention was paid to the method of modeling coherent pulse and CW radar based on the concern that the inputs and outputs should be maintained unclassified. In summary, it was demonstrated that simulation results, using the basic IMOM radar range equation adaptations, agreed with radar theory. In addition, the manner in which the radar range equation was modified by IMOM to account for stand-off-jamming effects was also reviewed. Typical operational values were substituted into these equations and results compared to those calculated by IMOM. The internal version number of the IMOM software associated with this thesis is the latest IMOM version 6.6 (August 2003).

However, before presenting the imaginary scenario and viewing the actual benefits of the IMOM model, it will be helpful to have a brief analysis of the IMOM model and its components and functions. Background information has been retrieved from various sources, but the core source was INEEL, which played a key role in the development of this product.

1.   Overview[179]

IMOM is part of the Contingency Theater Automated Planning System (CTAPS).   CTAPS is the "heart" of the Theater Battle Management Combat System (TBMCS) for the Joint Forces Air Component Commander (JFACC). CTAPS has the Combat Intelligence System (CIS) integrated to make actual intelligence information available to the Air Campaign Planners (ACP). In this way, the JFACC staff can access current intelligence, and support the production and execution of the Air Tasking Order (ATO)[180].

IMOM visually displays the complex interaction of multiple radar systems being acted upon by multiple ECM aircraft. IMOM models the detection capabilities of radar at virtually any altitude, considers target aircraft radar cross-section and altitude, terrain masking effects, and both stand-off jamming (SOJ) and self-protection jamming (SPJ) effects. IMOM is capable of loading a detailed Electronic Order of Battle (EOB) either manually or from virtually any system that maintains an automated feed and provides hard copy output analysis results in a wide variety of formats. The results of this model aids in the placement of standoff jammers against several defensive (air, land or sea based) radar systems in order to protect the friendly striker aircrafts[181]. In any scenario, the IMOM model is used to:

- Display enemy anti-aircraft weapon locations and can access the effectiveness of friendly employment of self protection measures
- Generate Orders of Battle
- Target Nomination List
- Produce weaponeering options
- Threat evaluation.

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[179] All the following information regarding the IMOM Model retrieved from, (unless specified otherwise), Idaho National Engineering and Environmental Laboratory (INEEL), *"Model Description (MD) for the Improved Many-On-Many (IMOM) Version 6.6, Solaris 2.8 and Windows 2000,"* Electronic Combat System Integration Project, WFO 90737, 1 August 2003.

[180] INEEL, Ibid.

[181] INEEL, Ibid., p. 254.

In other words, pilots and mission planners use the software to determine the range of hostile radar and weapons systems and to model effects of friendly jammer signals used against these radar systems. With this information, they are able to plot a route that will avoid detection or minimize the risk through the appropriate countermeasures. Moreover, they can run different scenarios that include potential countermeasures[182]. Finally, there are a number of automated planning tools available to help joint EW planners execute their responsibilities. These tools can be divided into three broad categories; databases, planning process aids, and graphic analysis tools. What is unique with IMOM is its ability to combine all the three above categories effectively into a single model.

2. Components

The IMOM model uses the following Electronic Combat (EC) components as described in detail in the Model Description (MD) manual. A general description of the key elements follows along with a brief explanation of their usage.

- *Airborne*[183]. Airborne components allow analysts to model airborne radar systems.

- *Antenna*[184]. The antenna is a key component for SOJ, receivers and transmitters.

- *Electronic Intelligence Notation (ELNOT)*[185]. The ELNOT component establishes a mapping between an ELNOT and one or more equipments which use that ELNOT. This component is used as a mechanism for identifying particular equipment (either radar or weapon).

- *Jammer*[186]. One of the primary purposes of this model is to calculate the effects of an electronic jammer against one or more radios in the network. Due to the simplicity of the jammer component, jammer parametric data is specified at run time, rather

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[182] INEEL, *Need to Know*, A National Security Newsletter, "*Evolution of a Program- The Electronic Combat System Integration*", Volume 1, Number 4, July 2001.

[183] Ibid., *"Model Description (MD) for the Improved Many-On-Many (IMOM) Version 6.6,"* p. 5.

[184] Ibid.

[185] Ibid., p. 6.

[186] Ibid.

than being stored in the database. Jammer parametric data includes the jammer's location, altitude, heading, output power, bandwidth, and jammer type. Other parameters not explicitly stated are the jammer's operating frequency and the antenna pattern. The jammer's operating frequency is based on parameters specified through any of the analysis functions. The antenna pattern is then determined based on the jammer type and the operating frequency.

- *Order of Battle (OB)*[187]. The OB is defined as the collection of radar and weapon sites to be considered in an analysis. The key information used by the analysis from the OB is the site location. The site's parametric database file provides the parametric data regarding the site.

- *Radar*[188]. The radar component describes a radar system in terms of the electronic signal emissions of interest to the IMOM model. Key elements of this component include radar function, emitter power, main beam (each radar can have up to 20 beams), side lobes and back lobe information (each radar can have up to 4 side lobes and 4 elevation side lobes). This component also included a Signal to Noise (S/N) ratio calculator for both Swerling cases I and II alpha and beta. As a Probability of False Alarm (P_{fa}), the IMOM uses 1×10^{-6} and for Probability of Detection (P_d) using 0.5 for radar types Early Warning (EW), Target Acquisition (TA), Height Finder (HF) and 0.9 for Target Track (TT) and Fire Control (FC).

- *Route*[189]. A route is defined by any number of route legs or points. For leg-based routes, each route leg has an associated start point, end point, altitude-specified as the mean sea level (MSL) or above ground level (AGL), and spacing between analysis sample points. For point-based routes, each point has an associated location, heading and altitude.

- *Suppression of Enemy Air Defense (SEAD) Weapon*[190]. The SEAD weapon component supports the SEAD Footprint analysis and the SEAD Radial analysis. The SEAD weapon component represents the coverage of any user defined weapon system that may be launched from an aircraft. The data is represented in three dimensions. In elevation, the user can define any number of altitude cuts. The altitude represents the launch altitude in FT AGL. The azimuthally values are the range of the weapon in nautical miles.

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[187] Ibid., p. 7.

[188] Ibid., p. 7.

[189] Ibid., p. 9.

[190] Ibid.

- *Stand-Off- Jammer* (SOJ)[191]. The SOJ component is also shared with the IMOM model. The SOJ model consists of a number of oscillators generating electronic noise into the environment, with specific frequencies, powers, and areas of coverage for each oscillator.

- *Weapon*[192]. The weapon component allows the user to describe various weapons systems, such as AAA's, SAM's, Close-in Weapons Systems (CIWS's), etc.

3. Analysis Functions

The IMOM model is comprised of seven basic analysis types: Contour, Maximum Range, Radial, Route, SEAD Footprint, SEAD Radial, and Site-to-Point. Each of the analysis includes the effects of signal strength, geometry, ECM, and terrain masking using actual digitized terrain data. The following table (Table 4.*2)* provides a description for every function.

Detection Contour Analysis
The contour analysis is used to analyze detection capabilities of the entire OB depicting threat engagement zones or outer limits of detection. The results drawn on the map look much like contours drawn on a geographic information system map showing common elevations. In the contour analysis, search radar detection contours, weapon radar detection contours, threat envelope contours and jamming contours are drawn. This analysis may include SOJ effects.
Detection Maximum Range Analysis
The Maximum Range analysis is used to provide a quick look maximum range study on the OB. For radar, the maximum range analysis calculates the maximum radar range of the various radar using the radar cross section (RCS) parameters specified, calculates the maximum line of sight (LOS) range based on the MSL altitude(s) and then plots the contour of the minimum of these two values for the entire OB. For weapon systems, the analysis plots either the maximum effective range or maximum kinematical range of the various weapon systems. The differences between the contour and maximum range analysis are: (1) no terrain masking occurs in the maximum range analysis and (2) the maximum range analysis result is a filled contour. The purpose of this analysis is to analyze a larger number of sites very quickly to yield a first order approximation of the detection capabilities of radar systems against a certain target aircraft as well as determine the various weapon ranges.

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[191] Ibid., p. 10.

[192] Ibid.

Detection Radial Analysis
The Radial analysis is normally performed on individual sites in the OB. This analysis is used for modeling detection capabilities. In a radial analysis, the model simulates moving a target along radials extending away from each site being analyzed. The analysis will move the aircraft along each radial in incremental steps. The step size will be a multiple of the current terrain resolution (specified in meters by the users at 100m for this research). Each of the radials in the radial analysis is color- coded depicting the resulting status for that point on the radial back to the site. The purpose of this analysis is to determine the overall threat/detection capabilities of a weapon/radar/airborne site against a target at a specified altitude. The analysis constructs radials on each up to 360 degrees around each radar site, depicting the detection capabilities of the weapon/radar up to a maximum distance away from the site. The analysis may or may not include the effects of SOJ and/or SPJ.
Detection Route Analysis
The Route analysis depicts the vulnerability/capability of a specific aircraft along a pre-defined flight path or route. Route analysis is used for modeling detection aircraft in conjunction with the sites in the current OB. As the route is described in the route scenario editor, each leg in a leg-based route is described with a leg spacing attribute that determines the analysis points for that route leg. In a point-based route, the analysis points at that route leg. In a point-based route, the analysis points are the points defined in the route. During a route analysis, each of these analysis points is analyzed against ALL the sites of the OB and an overall status is determined for this route point. As a result, the purpose of this analysis is to determine the detection vulnerability of the specified target aircraft against the sites in the OB. Each route point is colored according to its vulnerability.
SEAD Footprint Analysis
A Suppression of Enemy Air Defense (SEAD) footprint analysis aids in the planning of missions with SEAD weapons (i.e., anti-radiation missiles, for this research, HARM AGM-88). A SEAD footprint analysis depicts the possible target area around the launch aircraft of the selected anti-radiation missile. Inside the footprint, the line of radials extends from the launch aircraft to the SEAD weapons maximum range considering radar antenna height, terrain and aircraft heading. Finally, the question answered at the end is: What can my SEAD weapon hit from this location?

SEAD Radial Analysis
A Suppression of Enemy Air Defense (SEAD) radial analysis aids in the planning of missions with SEAD weapons. A SEAD radial analysis displays the SEAD weapon launch area around EACH OB site, considering aircraft height, terrain masking from the site to the aircraft height and the maximum launch range for the SEAD weapon on the aircraft. In other words, the results of the SEAD radial analysis depict the vulnerability of that site against an aircraft flying at the altitude specified, loaded with the SEAD weapon.
Detection Calculator (Point - to - Point) Analysis
The analysis calculator allows the user to perform simple point-to-point detection analyses. The inputs to the calculator are primarily independent of the current scenario (i.e., OB, Routes, etc.). The results of the calculator are posted in a text window and are not displayed on the map.

Table 4.2.   IMOM Analysis Functions[193]

4.   Core Functions

Table 4.3 illustrates the core functions, as presented by IMOM *Model's Description Manual*.

Radar Model[194]
i.   Radar Geometry. The radar parametric data defines the geometry for the scan limits, and also for each of the radar beams and lobes. These values are converted into cosine values for use in the analysis code.   ii.   Radar Range Equation The radar range equation is a critically important element of the IMOM model. At the lowest level of the analyses, the model uses RCS in the radar range equation (square meters) for determining the maximum detection distance for a radar system. Should the user specify an analysis be performed using LOS, Max Airframe, Frequency, or 3D Airframe, various types of lookups are performed to convert the user supplied data to an RCS. If LOS is specified, a value of 100,000 square meters will be used for the RCS. If Max Airframe is specified, the model will extract the maximum RCS from the aircraft parametric data files based on the appropriate frequency. If frequency is specified, looking up the frequencies of the radar beams in the specified frequency file and extracting the appropriate RCS for that frequency determine the RCS. If 3D Airframe is specified, then the RCS is determined by using current target aircraft geometry in relationship to the site to derive the appropriate RCS value from the aircraft parametric data. The radar range equation, as used in the model is specified in Equation 4.1

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[193] Ibid. pp. 11-12.

[194] Ibid. pp. 12-13.

$$(Equation\ 4.1) \qquad R^4 = \frac{P_tG_tG_r\sigma c^2P_c}{(4\pi)^3 BF_nKT_of^2S_{NR_I}L}$$

Where:
R: Radar range (dB)
P_t: Radar power (dB)
G_t: Transmitter Gain (dB)
G_r: Receiver Gain (dB)
σ :   Radar Cross Section (dB)
c: Speed of light
P_c: Pulse Compression Gain (dB)
B: Bandwidth (dB)
F_n :   Noise Figure (dB)
K :   Boltzmann's constant
T_o: Temperature at 290° (Kelvin)
F: Frequency (dB)
S_{NRI}:   Signal to Noise with Integration (dB)
L: Receiver Loss (dB)

*** Jamming Model***[195]

i.   SOJ Geometry
This portion of the jamming model calculates the geometry information between each of the SOJs in the jammer collection and the site being analyzed. A line of site determination is made between each of the jammers in the scenario and the site being considered. The results are stored in a data structure for use in jamming calculations later in the process.
ii.   SOJ Coverage
SOJ coverage determines which jammers, within LOS, covers the radar being analyzed, To determine if the radar is covered, the following checks are made:
        1.   Is the radar signal frequency within the transmit frequency range of at least one SOJ station?
        2.   Is the radar site within the SOJ's transmitting antenna beam azimuth?
If the SOJ can cover the radar then the effectiveness for each station (that covers the radar) is calculated. The effectiveness is defined as the part of the burn through range equation that is not dependent on the radar's antenna gain in the direction of the jammer. SOJ coverage returns the maximum and cumulative (additive) station effectiveness and a list of all SOJs that are effective against each radar beam.
iii.   SOJ Effectiveness
SOJ effectiveness is determined as follows:
        1.   Determine the maximum and cumulative station effectiveness from SOJ coverage
        2.   Add the appropriate radar antenna gain(s) to each station
        3.   Use the jamming techniques file to determine if multiple jammers are summed or not

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[195] Ibid. pp. 13-18.

4. Use either the maximum or cumulative effect of all the SOJs to calculate the burn through range of the radar along the line of bearing.

    iv.   Burn-through range Equation

The following equations show how the burn through equation for IMOM is derived, by first starting by determining the jamming to signal strength ratio at the detector surface (Equations 4.2, 4.3 and 4.4)

Radar Signal Strength @ Detector Equation (4.2)

$$S = \frac{P_t G_t G_r G_{pc} \sigma_T \lambda^2}{L_r (4\pi)^3 R_T^{\ 4} B_r}$$

Jammer Signal Strength @ Detector Equation (4.3)

$$\frac{J}{S} = \frac{P_j G_j G_{rj} (4\pi) R_T^{\ 4} B_r}{R_j B_j L_P P_t G_t G_r G_{pc} \sigma_T}$$

Jammer to Radar Signal Strength at Detector Equation (4.4)

$$\frac{J}{S} = \frac{P_j G_j G_{rj} (4\pi) R_T^{\ 4} B_r}{R_j B_j L_P P_t G_t G_r G_{pc} \sigma_T}$$

The burn through range is then determined as follows (Equation 4.5):

$$R_T = \left[\frac{R_j B j L_p P_t G_t G_r G_{pc} \sigma_T \left\{ \frac{1}{S/N} + \Delta \frac{J}{S} \right\}}{P_j G_j G_{rj} (4\pi) B_r} \right]^{\frac{1}{4}}$$

$$R_T = \left[\frac{R_j B j L_p P_t G_t G_r G_{pc} \sigma_T \frac{J}{S}}{P_j G_j G_{rj} (4\pi) B_r} \right]$$

Note, that in IMOM
$$\frac{J}{S} = \left\{ \frac{1}{S/N} + \Delta \frac{J}{S} \right\}$$

Therefore, the IMOM burn through range is (Equation 4.6):

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[196] Figure available at INEEL, Need to Know, Ibid.

$$R_{\mathrm{T}} = \left[\frac{R_j Bj L_p P_t G_t G_r G_{pc} \sigma_T \left\{ \dfrac{1}{S/N} + \Delta \dfrac{J}{S} \right\}}{P_j G_j G_{rj}(4\pi)B_r} \right]^{\frac{1}{4}}$$

v.   SPJ Effectiveness

At this point, IMOM gets the SPJ parametric data for the specified SPJ aircraft. Then, it loops through each of the entries in the parametric data looking for a match on pod and equipment code. If a match is found, then it subtracts the AGL altitude of the target aircraft measured directly above the weapon from the AGL pod altitude specified in the parametric data (this is consistent with the SPJ parametric data). By keeping the matched entry with the smallest difference, IMOM could then look up the SPJ effectiveness for that entry. It will be either a 1 (POOR SPJ), 2 (FAIR SPJ), or 3 (GOOD SPJ). If no matches are found, then SPJ effectiveness will be POOR SPJ.

vi.   Antenna Polarization Loss

The jamming burn through equation defines a term for antenna polarization loss. This loss is determined by a look up table within the code. For more information about Polarization Loss, refer to the IMOM MD manual.

vii.   Terrain Model –Digital Terrain Elevation Data (DTED)

IMOM uses Digital Terrain Elevation Data (DTED) for all of its terrain masking and geometry calculations. IMOM retrieves the data in raw DTED formats supporting both level 0 and level 1 data from the National Imagery and Mapping Agency (NIMA). DTED values represent the terrain elevation values referenced to mean sea level (MSL) datum recorded to the nearest meter. The horizontal position is referenced to precise longitude – latitude locations in terms of the current World Geodetic System (WGS), determined for each DTED file by reference to the origin at the southwest corner. The elevations are evenly spaced in latitude and longitude at the interval of the terrain resolution. Requested locations are rounded such that the closest DTED terrain post is used.

viii.   Terrain Masking Model

The method used in the analyses to determine terrain masking is by computing the look angle from the site to the target aircraft and also the look angle from the site to the highest surface terrain point between the site and the point directly below the target aircraft. If the look angle to the terrain is greater than the look angle to the target aircraft, then the target aircraft is terrain masked. (This comparison is done using the cosines of the angles. The algorithm uses the law of cosines and a cosine identity to construct an equation which determines the look angles as cosine values. These values may then be compared to determine terrain masking). Figure 4.3 shows a quite similar terrain analysis such as that of IMOM.
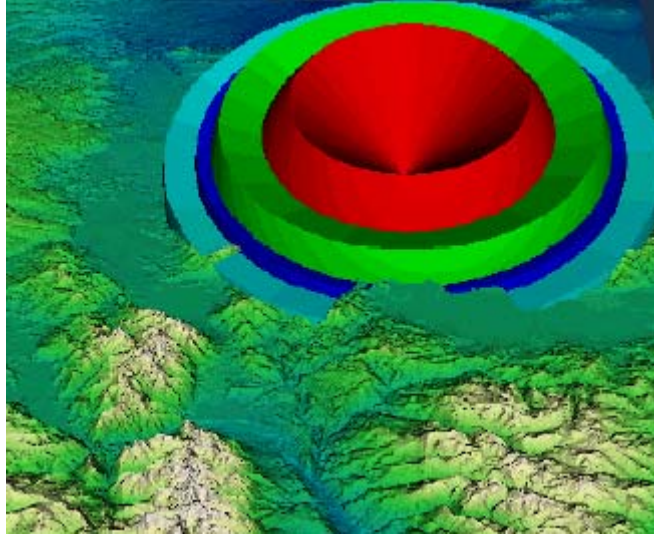
Figure 4.3.   Terrain Analysis[196]

Table 4.3.   Core Functions[197]

Quality personnel, through training and experience, are the origin of operational decision superiority. The goal should be to provide technical decision support tools, such as IMOM, to improve the commander's ability to gather, access, analyze, act on data and also make timely and informed decisions. The following chapter, "Save Atlantia 2008", illustrates the abilities of the IMOM model in an imaginary scenario and provides recommendations for taking the necessary steps towards the application of an effective EW unit in the ESDP.

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[197] Ibid. pp. 12-18.

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V. EU'S RRF SCENARIO "SAVE ATLANTIA 2008"

For the purpose of this thesis, the IMOM model was used to simulate a future RRF engagement in a high intensity conflict. The databases used are unclassified.

A. THE SCENARIO

An imaginary task in 2008 requires an EU air campaign against a high threat environment in the south mainland of Greece (Peloponnesus). In this scenario, called "Save Atlantia 2008", a specific Air Task Order (ATO) assigned an *Air Interdiction (AI) operation:* Its goal is to destroy, neutralize, divert, and delay the enemy's surface military potential before it can be used effectively against friendly forces. Typical targets include petroleum, oil, and lubrication storage centers (POL), lines of communication (LOC) and lines of supply (LOS). A significant force of EU fighter aircrafts (F-16, M-2000, Tornado and Harriers) with other support assets (AEW, SEAD and Stand-Off Jammer aircrafts) can take off either from the EU carrier located in Aegean Sea or land bases, can carry large payloads, fly a relatively long distance, at low or high altitudes and accurately deliver the ordnance such as dumb bombs and laser-guided bombs (LGBs) day and night by using the Targeting Pod of the LANTIRN system. Figure 5.1 shows the Name Area of Interest (NAU) and its DTED coverage (square dots).
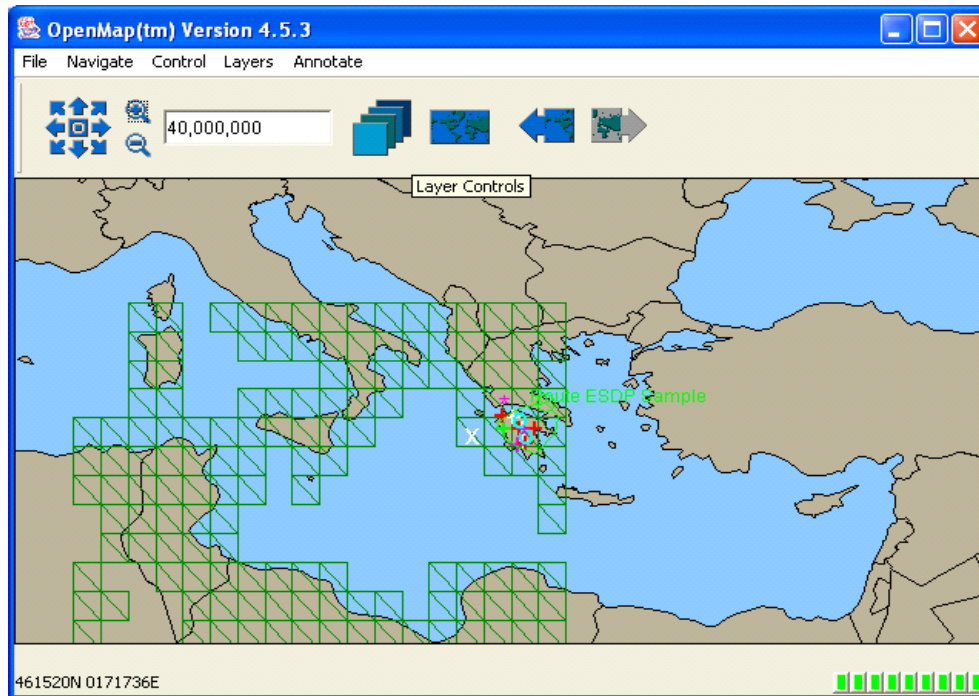
Figure 5.1.   NAI and the Available DTED Coverage

B.   MISSION PROFILE

The fuel requirements for this mission led directly to the choice of mission profile. Mission profile defines the altitude structure of the route of flight and is typically described in terms of "ingress altitude-attack altitude-egress altitude". The high profile has the most economical fuel expenditure, and the low has the highest fuel expenditure. For this mission flown at the maximum range of the aircraft, a common profile choice was "high-low-high profile". This profile saves fuel to and from the target but allows a low altitude attack. In addition, keep in mind the threat along the way. A high ingress may be advantageous from a fuel burn perspective, but may be ill-conceived when taking into consideration en-route AAA, Air or SAM threats. Figure 5.2 shows the profile and the Area of Interest (AOI) with several threats in Figure 5.3.

HIGH - LOW - HIGH PROFILE

Climb to cruise altitude
for return to base.

Climb to cruise
altitude.

Descend to run in
altitude prior to
reaching maximum
enemy detection range.

LOW<2000 FT

Use terrain masking.

Target

OUR BASE
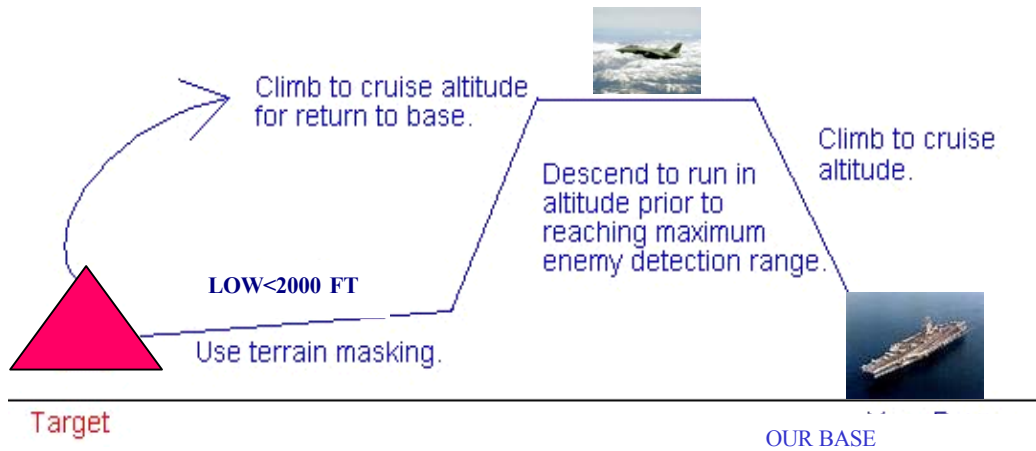
Figure 5.2.   Mission Profile[198]

OpenMap(tm) Version 4.5.3

File   Navigate   Control   Layers   Annotate

10,000,000

Zoom Out

Route ESDP Sample

391738N 0213425E
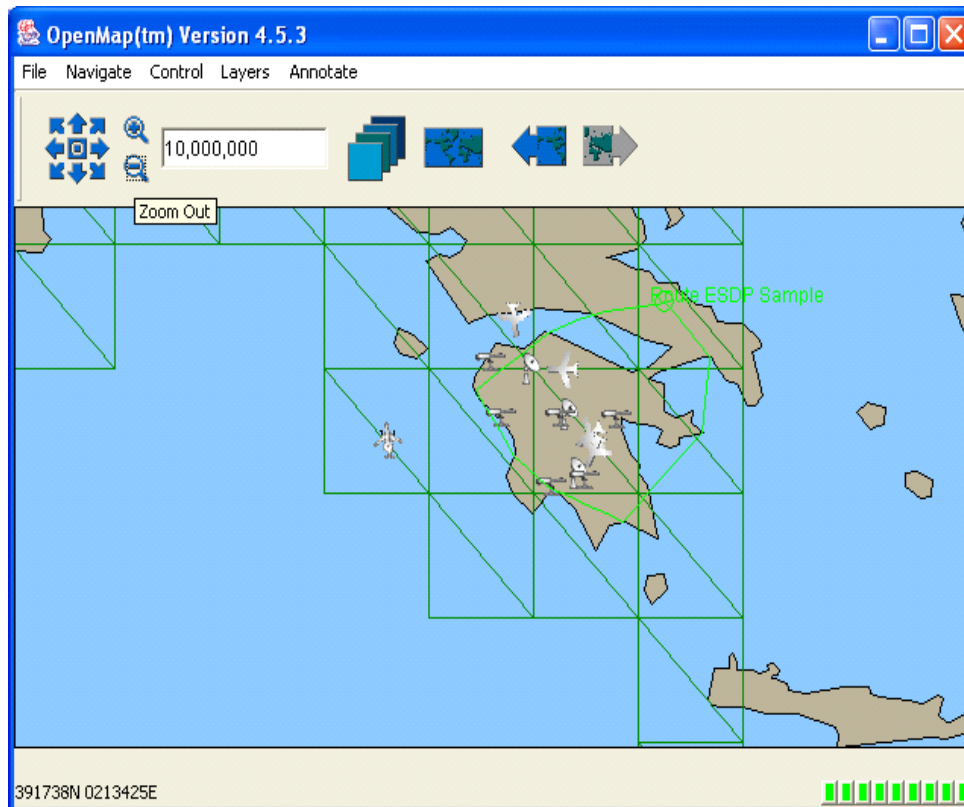
Figure 5.3.   AOI and Threats

[198] After: Figure available at http://www.simhq.com/simhq3/sims/air_combat/mission2/fig8.jpg, accessed 12 May 2004.

C.   MISSION COMBAT PLANNING CONSIDERATIONS- INGRESS

In this simulation, assume the scenario of having just crossed into an enemy's country. The part of this mission from the sea or land base to the target is known as the "ingress phase" (Figure 5.4).
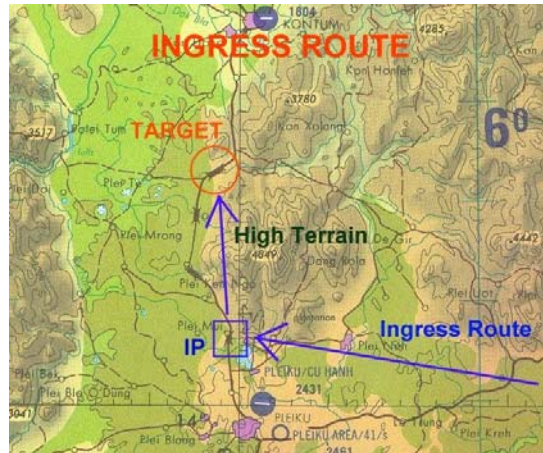
Figure 5.4.   Ingress Phase[199]

In many respects, the ingress can be just as challenging and exciting as the actual attack. Pilots used to say, "Getting there is half the fun." There are many dangers and obstacles lurking along the route to the target and these challenges will be either overcome or maneuvered to avoid them. The bottom line is the need to arrive at the target with enough fuel, weapons, and aircrafts to guarantee target destruction. The lack of any or all of these because of enrooted mistakes jeopardizes the mission before it even begins, which is not desired, and therefore, attention to ingress considerations is an excellent way to ensure the outcome. Line abreast formations (spread) for flight at medium to high altitude and where an air threat is likely. They provide the best six o'clock lookout for all flight members. Angled back formations, such as "wedge,' are well suited for low level flight when terrain avoidance is a significant consideration. An effective route in and out of the target area was planned, and the waypoints replotted to take advantage of the mountainous terrain. The Initial Point (IP) was located no

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[199] Figure available at http://www.simhq.com/simhq3/sims/air_combat/mission2/fig9.jpg, accessed 12 May 2004.

more than two to three minutes from the target. At typical attack speeds, 450-480 Knots, this equates to approximately 15 to 25 miles. The priority during the run-in is target location and target ID, threat activity, followed by navigation.

When planning the mission, it is necessary to meet timing requirements, such as meeting the air-refueling tanker at a specific time, rendezvousing with AEW and other EW support forces, and hitting the target at a given time. The Time on Target (TOT) is one of the highest priority goals of the entire mission. Once the "fence" is crossed, hostile country is entered and it is imperative to be prepared. At this phase, intelligence can use IMOM information to brief the Combatant Commander or the pilot going into combat. Moreover, modern warfare is conducted with sophisticated detection and communication systems. Survival is dependent on knowing where those systems are and the range of their detection and operation. Figure 5.5 shows a detailed IMOM maximum range analysis of the AOI and a maximum weapons range.
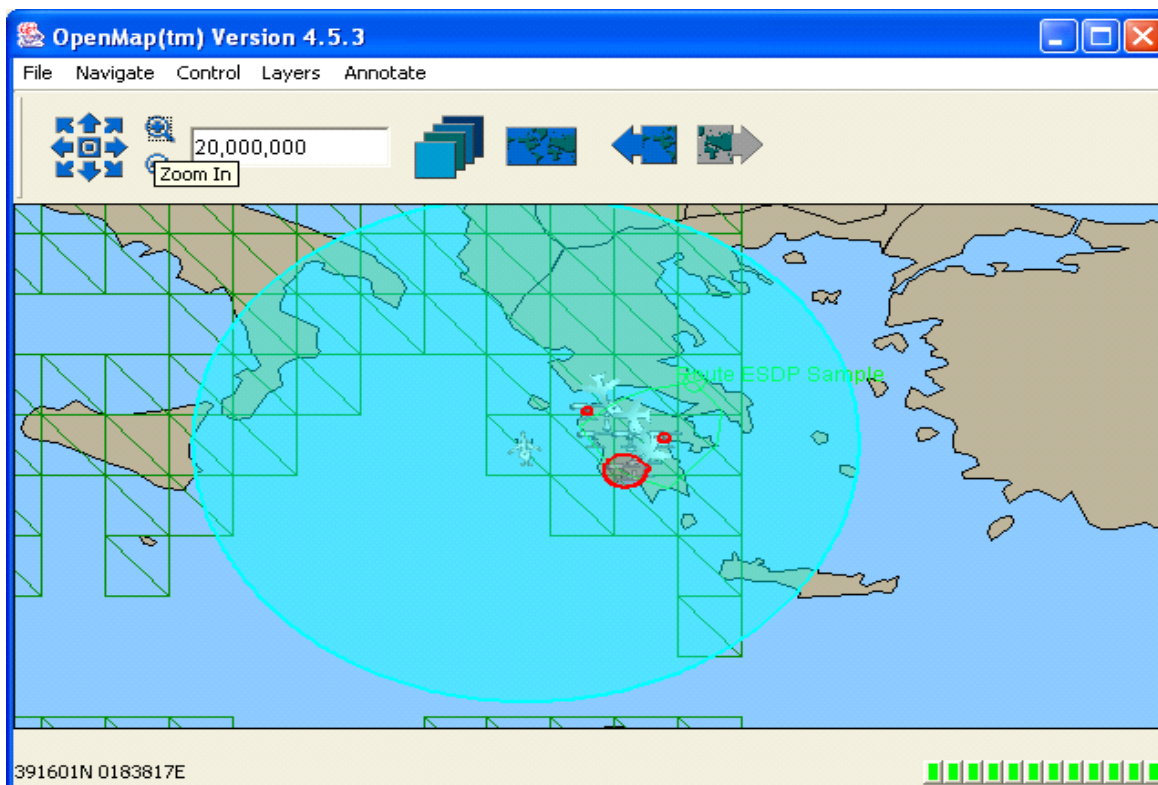
Figure 5.5.   Maximum AOI Range Analysis and maximum Weapons Ranges

D. MISSION COMBAT PLANNING CONSIDERATIONS- ATTACK

The best attack plan is one that assures target destruction and maximizes the enemy's surprise and confusion. The run is planned to achieve two things: approach the target unobserved or undetected and terrain masking to best advantage. The large ship formation is divided into two elements to attack from opposite directions at the same time as shown in Figure 5.6.
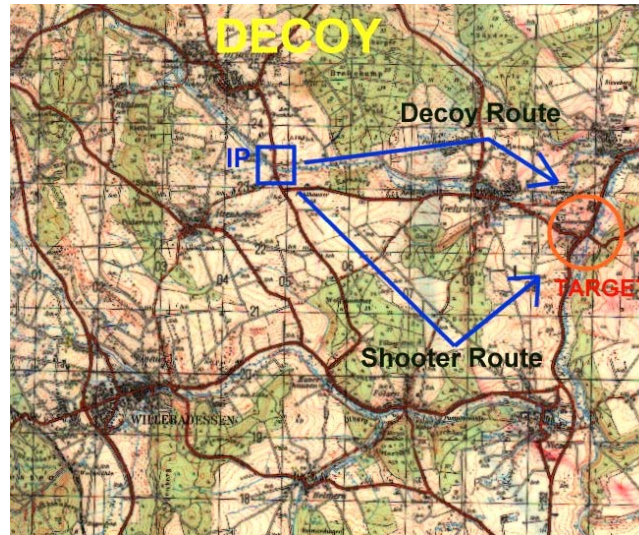
Figure 5.6.   Attack Phase[200]

The high threat situation includes Surface Air Missiles (SAMs) and radar controlled large caliber and Anti-Aircraft Artilleries (AAA). Support in ECM and stand-off weapon capability has mitigated this rule of thumb to some extent. It is still possible for the purposes of this simulation; however, to maintain the traditional assumptions regarding low altitude ingress/terrain masking techniques in a high threat area of mobile SA-19 systems. SAMs and AAA defend the target well, and as a result, it is possible to plan a low altitude, pop-up attack using terrain masking, as shown in Figure 5.7. The intent is to use ECM support with Stand-Off Jamming (SOJ) and stand-off weapons or delivery methods continuously. It is necessary, however, to avoid a re-attack of the target.

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[200] Figure available at http://www.simhq.com/simhq3/sims/air_combat/mission2/fig11.jpg, accessed 12 May 2004.

THE POP-UP MANEUVER

PULL DOWN

PULL OFF

The attacker
inverts and pulls down to
the target

PULL UP

In the pullup,
the attacker climbs and
offsets to keep the target in sight.

WEAPON RELEASE

TARGET
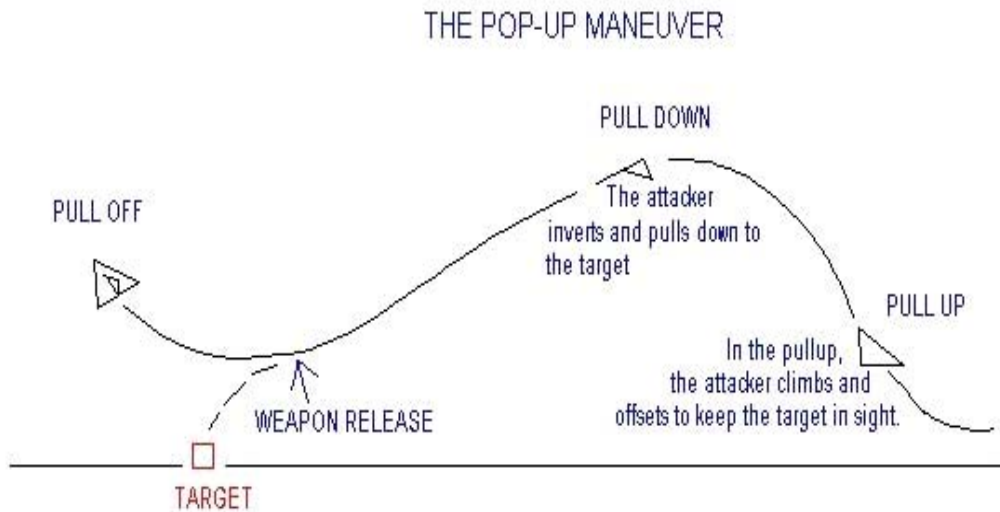
Figure 5.7.   Low Altitude/Pop-Up Attack[201]

E.   MISSION COMBAT PLANNING CONSIDERATIONS- EGRESS

The ingress route is not the same as the egress route. The egress route is planned considering the fuel state, tanker location, nearest friendly border/area, and terrain, as shown in Figure 5.8.
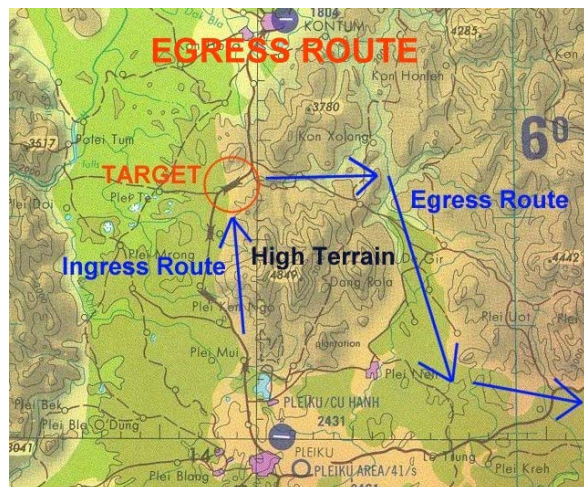
Figure 5.8.   Egress Phase[202]

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[201] Figure available at http://www.simhq.com/simhq3/sims/air_combat/mission2/fig12.jpg, accessed 12 May 2004

Also planned is a climb to an optimum fuel conservation altitude as soon as possible, threat permitting, as well as an emergency recovery plan for any battle damaged aircrafts to land in a divert field. Finally, the mission includes a safe recovery plan. This a pre-briefed plan that makes it possible to approach the base and be seen as incoming friends.

F.   IMOM ROUTE ANALYSIS

The EU Air Force can accomplish this specific Air Task Order (ATO) either by using SOJ or not. The following IMOM simulation shows the real aircraft detection from all threats in the AOI, and provides a report, which suggests the best Course of Action (COA) in the pre-planned route. By initiating a detection contour analysis, as shown in Figure 5.9, the IMOM program analyzes each site (Radar, SAM, AAA), which is already in the OB. Then, based on the flying altitude of the target in the specific AOI, as shown in Figure 5.10, the results of Figure 5.11 are calculated.
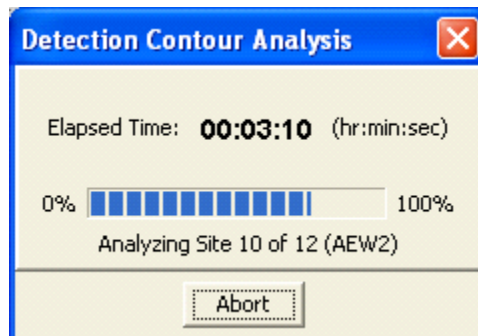
Figure 5.9.   Initiating a Contour Analysis

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202 Figure available at http://www.simhq.com/simhq3/sims/air_combat/mission2/fig15.jpg, accessed 12 May 2004
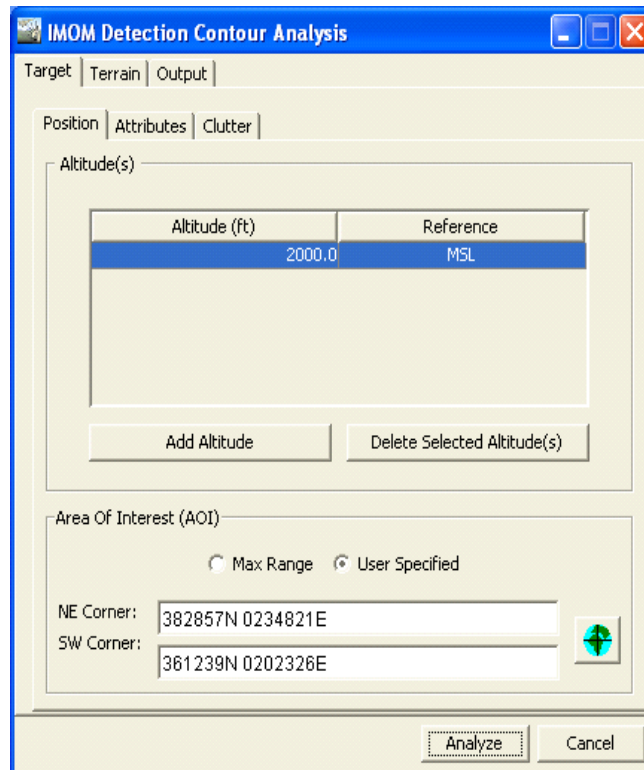
Figure 5.10. Aircraft's Altitude and AOI Analysis
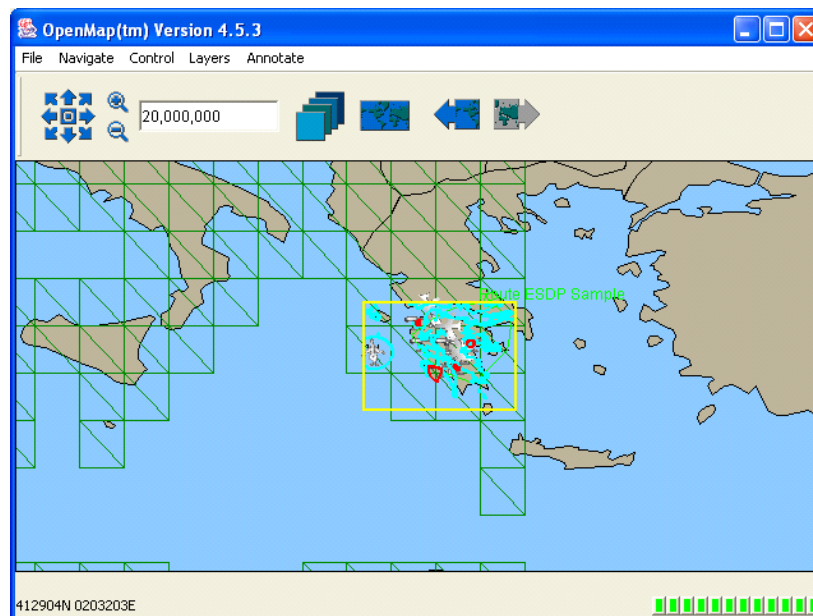
Figure 5.11. Contour Analysis of the AOI

Figure 5.12 shows a more detailed representation of the AOI. Zooming-in provides a more detailed analysis of each radar or weapon site.
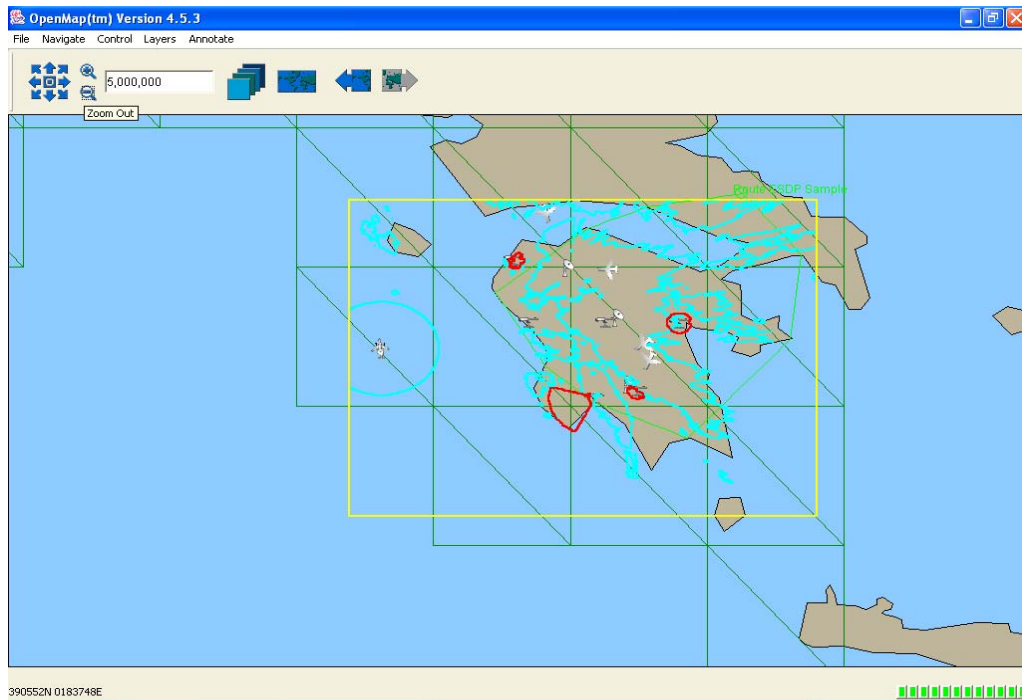
Figure 5.12. Zoom in the AOI

The next step is to request the Radial Analysis of each site. are shown in Figures 5.13 and 5.14 show the graphical results. Appendix A shows the detailed Route Analysis Reports. Based on this analysis, and in order to avoid detection from a specific threat, it is then possible to first modify the altitude for terrain masking that suggested from the report, change the route, or lastly, modify the SOJ parameters in order to be more effective in a specific threat (EW Radar, FC Radar, SAM, AAA etc.).
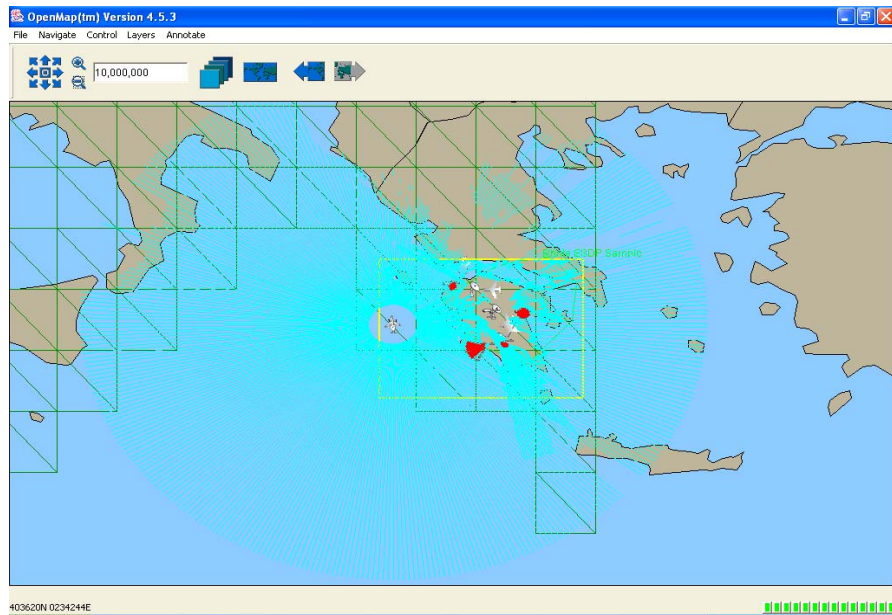
Figure 5.13. Radial Analysis of AOI
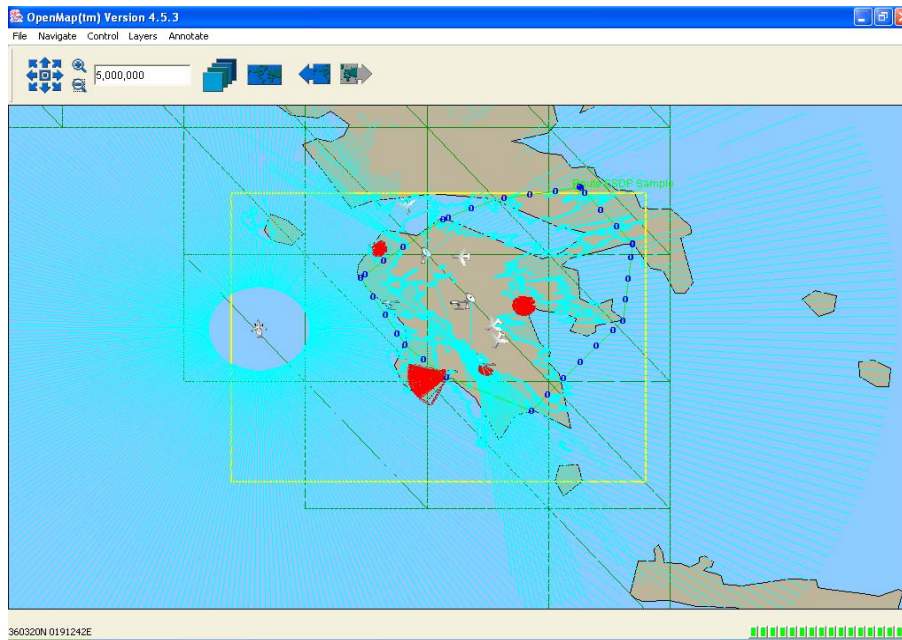
Figure 5.14. AOI Radial Analysis

G.   CREATION OF DATABASES FOR IMOM – ESDP SCENARIO

The Stand-Off Jammer (SOJ) Scenario Editor provides the means to add, modify and delete SOJ aircraft in the current scenario. The SOJs are assumed to be stationary, but each jammer may have multiple transmitters, with multiple time-multiplexed oscillators and its own jamming technique. Figures 5.15 and

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5.16 shows SOJ sites added to the IMOM-ESDP scenario with unique jammer parameters, aircraft altitude and heading information. Next, prime function of IMOM analyzed and displayed the EC environment conditioned by the effects of SOJ. The process of defining SOJ configurations depends upon establishing appropriate transmitter, and jamming techniques files. Generally, the data files necessary to accomplish this were provided with the model. The SOJ editor provided the ability to add/modify SOJs in the current scenario, load/modify the stations (transmitters) per SOJ, and add/modify time-multiplexed oscillators to each SOJ station, also described in Appendix C.
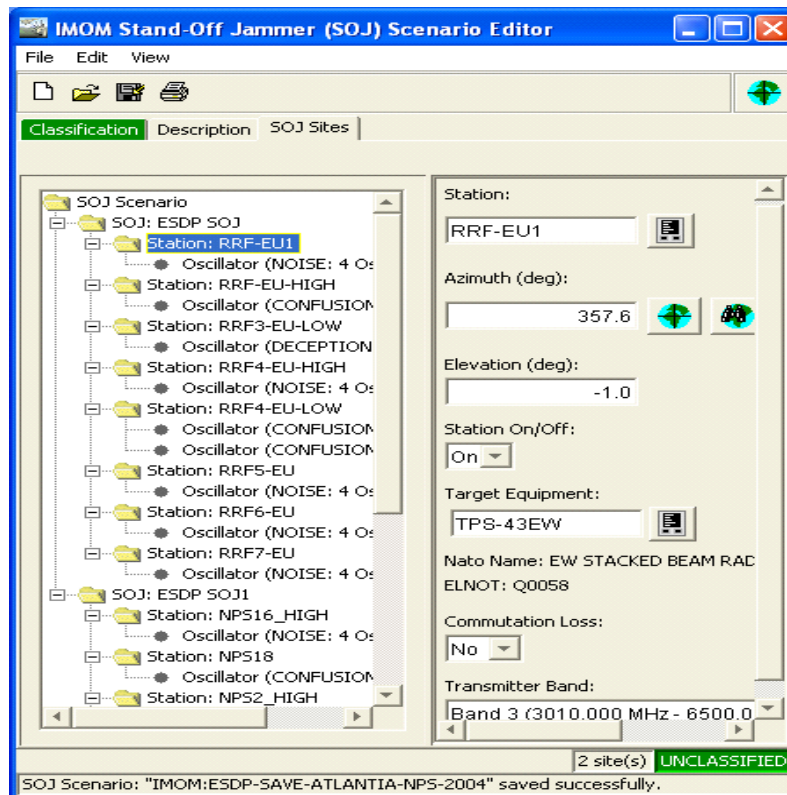
Figure 5.15. Stand of Jammer Editor/Parameters
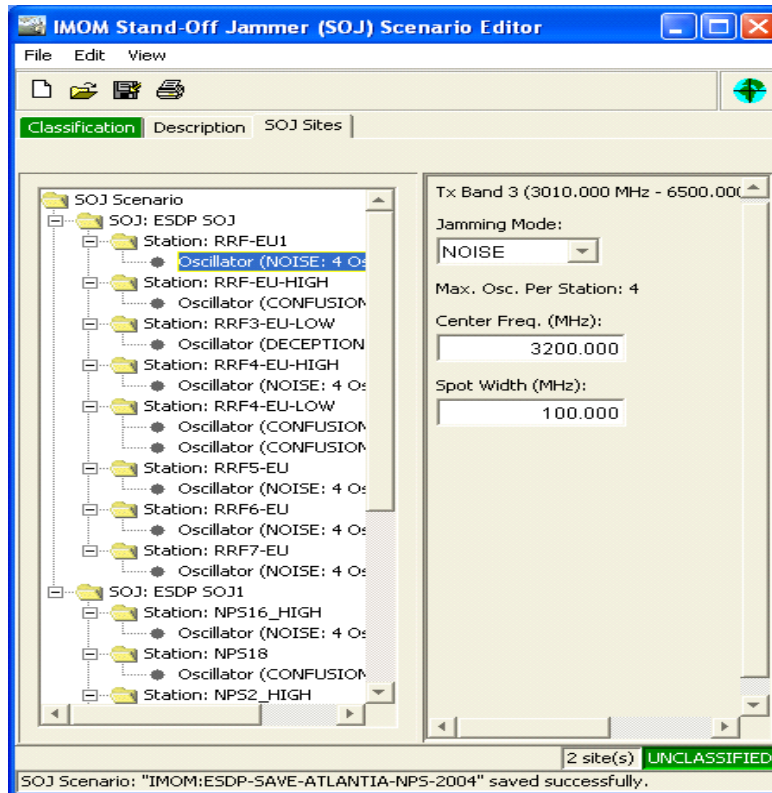
Figure 5.16. SOJ Editor/Noise Jamming Mode

The radar parameters shown on the radar form provide both geometry and operational parameters of the specific radar.   The IMOM Model Description manual provides a detailed description of each of the parameters as well the use of each one in the analysis functions. Figures 5.17 and 5.18 provide the radar parameters form, and a description form for the EW radar TPS-43, respectively. For the purposes of this scenario, similar databases were created for several radar function types such as AEW, Fire control (FC), Target Tracking (TT), Early Warning (EW) Radar, Height Finder (HF) or Target Acquisition (TA) radars part of which is shown in Appendix B (i.e., Radar TPS-43).

Figure 5.17. Radar Parameters form for TPS-43 Radar

Figure 5.18. Radar Description Form for TPS-43 Radar

Finally, the weapon function provides the means to define capability envelopes for any weapon system. The system capability envelopes can be thought of as 3D volumes about the weapon defined by the minimum effective range, maximum effective range, maximum kinematic range and altitude. As regards the ranges, the minimum and maximum ranges specified in nautical miles correspond to the weapons lethal envelope. The effective range, shown in red in the Weapon Lethality Display, represents the effective range of the weapon system to acquire and engage a target, and is used by IMOM to perform the most of the analyses. The kinematic range, which is how far the missile can travel, is shown in a transparent red in the Weapon Lethality Display. For the purposes of this scenario, a database, also described in Appendix C, was created with several weapons systems, shown in Figure 5.19.
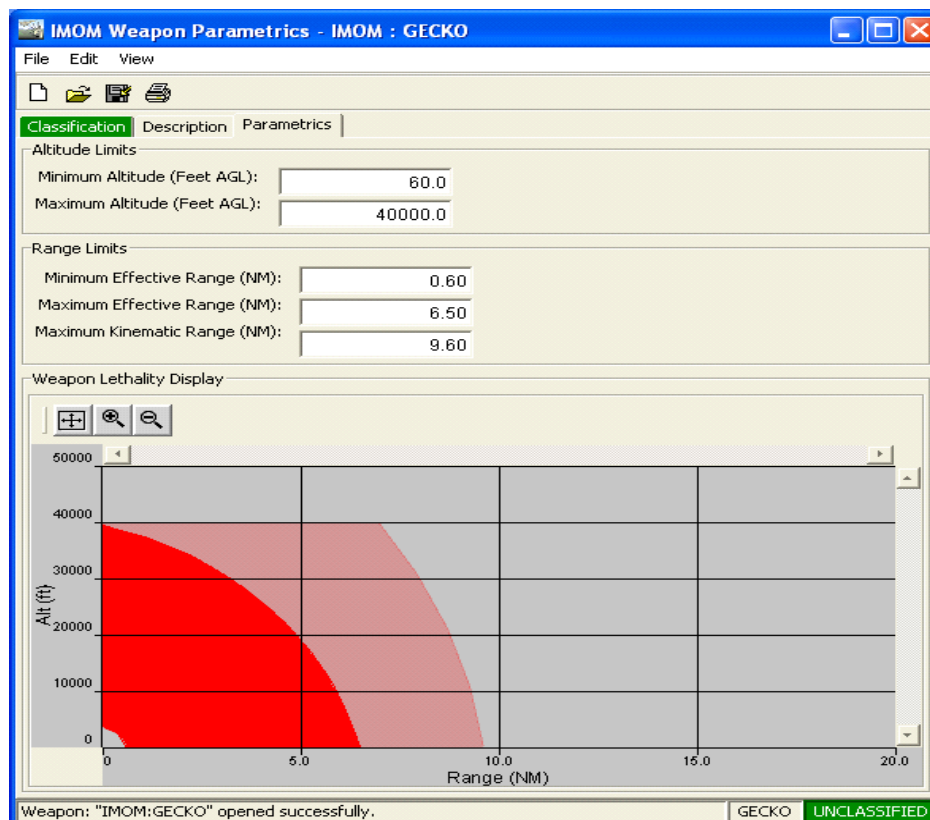
Figure 5.19. Weapon Parameters for 2S6 System-"GECKO"

At this point, it is commendable to mention that it is possible to direct IMOM's graphical outputs to various map overlays or in another mapping software product, such as Falcon View. Falcon View, an integral part of Personal Flight Planning Software (PFPS), is a Windows 95 and Windows NT mapping system that displays various types of maps and geographically referenced overlays. Falcon View is a separately installed product and is not packaged with the IMOM installation CD. As a result, and in order to keep this thesis unclassified, an attempt was not made to present any map overlay for the outputs of the scenario "Save Atlantia 2008". However, by reviewing the following Figures 5.20, 5.21 and 5.22, which already exist in the literature, the reader may have a better understanding of it is possible to combine the IMOM results with the Falcon View software.
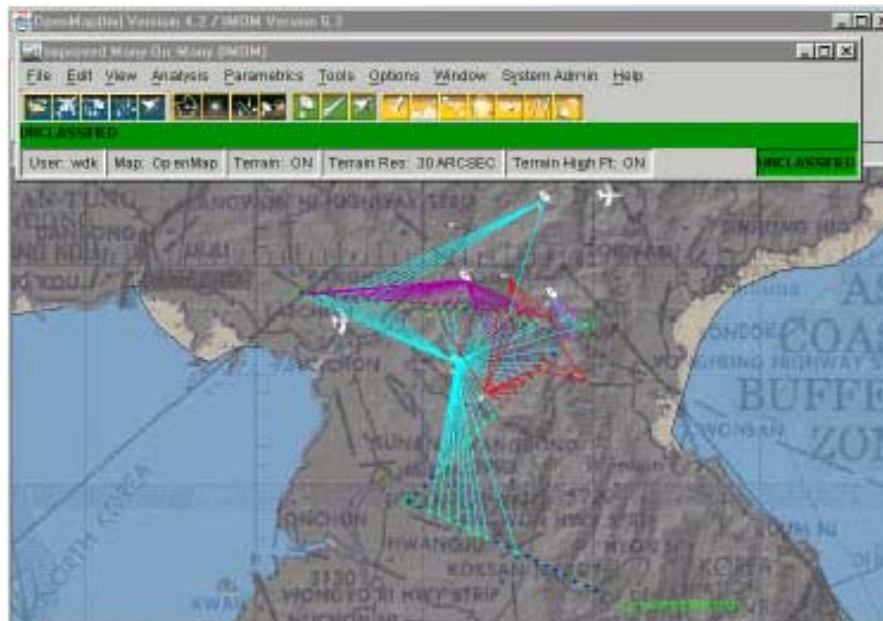
Figure 5.20. IMOM Graphic Representation Combined with Falcon View[203]

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[203] Available at http://www.inel.gov/nationalsecurity/newsletter/jul2001.pdf, accessed 28 May 2004.
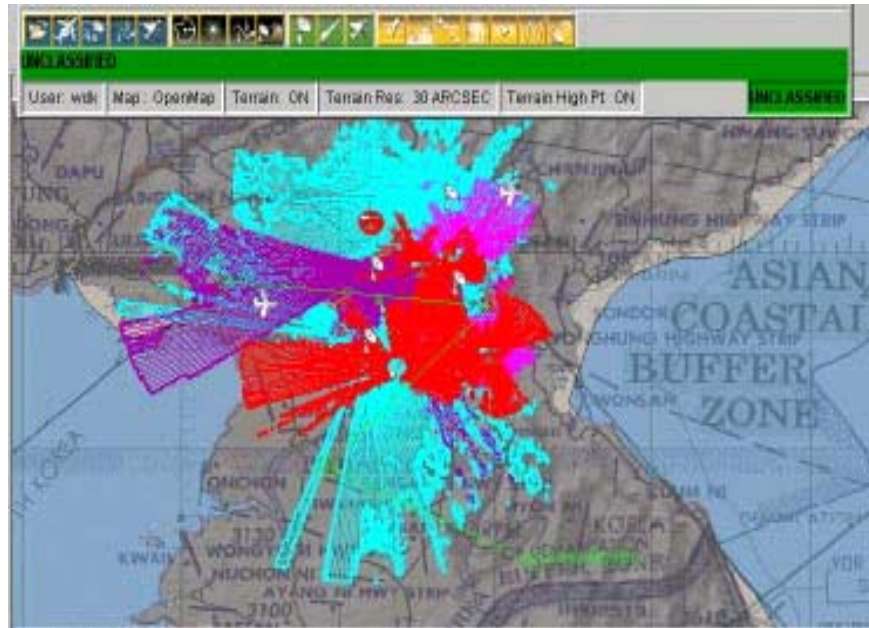
Figure 5.21. Contour Analysis in IMOM Model Combined with Falcon View[204]
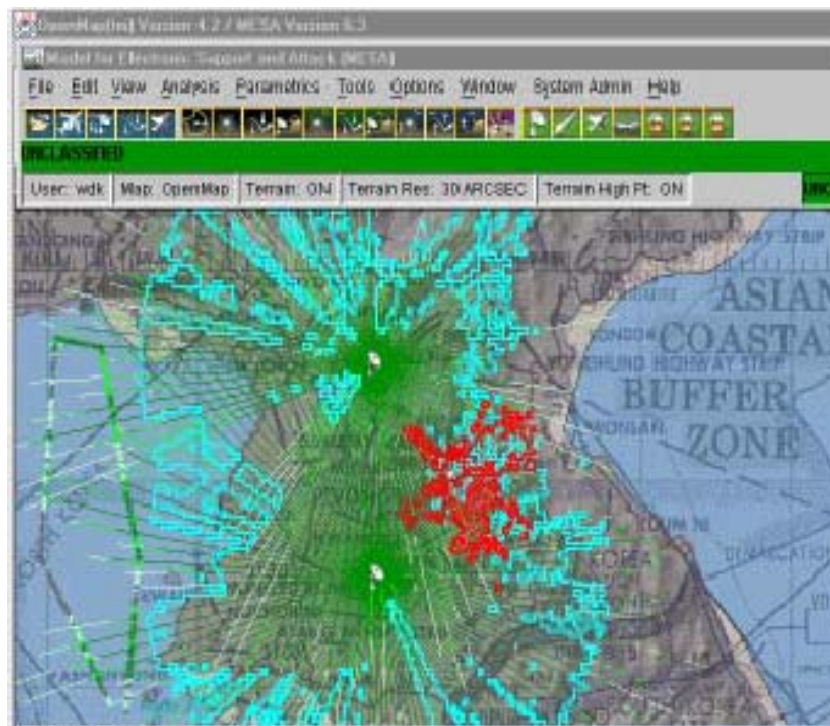
Figure 5.22. Radar Radial Analysis in IMOM Model Combined with Falcon View[205]

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[204] Available at http://www.inel.gov/nationalsecurity/newsletter/jul2001.pdf, accessed 28 May 2004.

[205] Ibid.

H.   IMOM MODEL CONCLUSIONS

It has been obvious that in the aforementioned planning procedure, IMOM played an important role. Based on the model results, the EW component air planners[206]:

- Determine the type, geographic location, and level of hostility expected during the operation to be planned.

- Determine the type of Electronic Support (ES) platforms and products available to support the operation.

- Determine the number and type of EW platforms that could reasonably be expected to be tasked to support the joint operation being planned.

- Review the requirement for EW support to the SEAD effort.

- Recommend to the Operation Director (J-3) or Plan Director (J-5) staff the type and number of EW assets to be requested from component or supporting commands.

- During Crisis Action Planning (CAP), evaluate each Course of Action (COA) considered with respect to EW resources required and the EW opportunities and vulnerabilities inherent in the COA.

In addition, it is important to remember that IMOM is not a time-consuming process. It is a quick, flexible and useful decision making tool, both for Commander's or Staff Estimates, particularly in a time constrained environment. Finally,

> EW planners should have an understanding of how such modeling systems are computing the graphics being displayed. Such an understanding, combined with operational experience, is the basis on which planners must rely to judge the strengths and weaknesses of different modeling tools and determine what is and is not an appropriate use of such systems[207].

I.   EW IN THE MILITARY DECISION MAKING PROCESS

It is a main goal of this thesis to emphasize the need for EU to consider EW seriously. The creation of a joint doctrine for Electronic Warfare among the member states is an important step towards military effectiveness and success.

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[206] Joint Pub 3-51, Ibid.

[207] Joint Pub 3-51, p. III-9.

Moreover, the nominal organization of staff functions to plan and execute EW and the command relationships of EW in joint EU operations should be as follows[208]:

- The RRF Commander should assign missions; organize EW forces and direct coordination of joint EW operations.

- The RRF Targeting Coordination Board, through a macro view of the battlefield, should resolve conflicting component priorities.

- The RRF Staff Operation Director (similar to J-3 in NATO) should have primary responsibility for EW activity. Authority for planning and supervising joint EW is normally delegated by the RRF Commander to the RRF Force Staff Operation Director. When so authorized, the RRF Force Staff Operation Director will have the primary staff responsibility of planning, coordinating, integrating, and ensuring execution of joint force EW operations.

- The RRF Intelligence Director (similar to J-2 in NATO) should be responsible for timely processing of intelligence for EW; evaluates planned EW operations in order to identify intel requirements and other conflicts with intel collection operations; advise RRF Commander, RRF Force Staff Operation Director on risks of Electronic Attack (EA) employment, and frequencies to be guarded to RRF Staff Communications Electronics Director (similar to J-6 in NATO). Finally, the director should support tactical deception plans.

- The RRF Staff Communications Electronics Director should be responsible for coordinating the use of an EM spectrum for C4 systems and weapons, as well as developing the RRF Restricted Frequency list.

However, each military service has a different approach to organizing their forces in order to plan and execute EW. Since this thesis uses the Air Force as a core example, due to the importance of EW in the success of the mission, it is essential to emphasize the following. Within the Air Force component, there are dedicated EW support assets under the operational control of the Air Force Commander. Within the Air Force Commander headquarters, the office of primary responsibility for EW should be the RRF Operations Directorate (such as A-3 for NATO) and RRF Plans Directorate (such as A-5 for NATO). Functional

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[208] Functional planning, directing and control of Air Force EW assets are normally conducted by the JFACC through the Joint air operations center's Director and its Information Warfare Team, by means of Air Task Orders (ATOs). Information retrieved from Joint Pub 3-51, "Joint Doctrine for Electronic Warfare," 7 April 2000.

planning, directing, and control of Air Force EW assets, however, should be normally conducted by the RRF Air Force Component Commander through the joint air operations center's Director and its Information Warfare Team, by means of the ATO. In response to the ATO, wing and unit level staffs and individuals aircrews should then develop the detailed tactical planning for specific EW missions. In the scenario "Save Atlantia 2008", the planning and the decision-making process followed the steps, used in any real military scenario, summarized in Table 5.1. The real competitive advantage in this process is the testing of the scenario when using the IMOM Model.

Military Decision Making Process
- Receipt of mission (ATO)   - Mission Analysis   - Situation development   - Crisis assessment   - COA development   - Model EW effects   - Supports staff estimates for each COA   - COA Analysis (**Route Analysis Report-IMOM**)   - Utilize automated models   - War game in conjunction with other EW COAs   - COA Comparison and Decision   - Brief RRF Air Commander, and RRF Operations Directorate   - Execution Planning – Orders Production   - Execution

Table 5.1.   Steps in the Military Decision Making Process

J.   RECOMMENDATIONS

To summarize this chapter, it is concluded that EW plays a vital role in the development of ESDP. It will provide RRF with an enormous advantage and the

ability to increase effectiveness during operations. It is possible to make many recommendations in this field. The following list emphasizes areas in which ESDP should pay initial attention.

- *Organize EU's RRF to Plan and Execute Electronic Warfare:* Following NATO's footsteps, undoubtedly the leader in this area, it is necessary to create an ESDP's Electronic Warfare Plans Directorate (EWPD) and an ESDP's Electronic Warfare Operations Directorate (EWOD). EU member states will have to contribute skilled manpower and technical infrastructure. A broader knowledge of EW systems capabilities and components is essential. Both directorates should have the primary responsibility of planning, coordination, and integration of the joint Rapid Reaction Force in EW operations.

- *Develop a RRF Operational Doctrine for Electronic Warfare:* The new policy should provide a doctrinal guidance on the use of EW in RRF's joint operations. Furthermore, it should focus on staff organization, planning procedures, coordination during operations, training and exercise considerations, and allied and third countries considerations in planning and conducting joint EW.

- *Increase the Interoperability with NATO Assets:* The ESDP should cooperate with NATO wherever and whenever necessary. Joint standards and practices procedures as well as repeated exchange of information between ESDP and NATO are a crucial factor in the development of a highly effective RRF EW unit.

- *Establish an EW Exercise Planning Policy and EW Activities:* Joint exercises are the only way to exercise RRF's Electronic Warfare capabilities in mutually supportive operations. These exercises will give a unique opportunity for EW staff personnel to prepare, plan, execute any EW scenario and evaluate the EW officer's responsibilities, the risks in the operational area and the type of mission which the staff must plan.

- *Examine the Multinational Aspects of EW:* The EW planners must provide EW support to allied or other non-EU countries, as ESDP's EW is an integral part of multinational operations.

- *Procure a Certain Number of Available Automated Planning Tools:* There are several planning tools, such as the IMOM model. These tools could help joint EW's planners to execute their responsibilities, in time constrained environments.

- *Increase the Defense expenditures- Limit the Equipment Procurement:* "Each year, the intensity and sophistication of electronic combat increases. All means, including tactics,

technology, and superhuman fortitude, are applied to prevail in the EW battle"[209]. However, today, EU countries have dedicated resources more to personnel and equipments and much less to R&D programs. Overall, it seems necessary that ESDP should devote more money to R&D. EU countries should have a twofold obligation: they must not only spend better but also spend more.

Last but not least, the EU's member-states contributions in EW personnel and assets should become a commitment. If an EW unit is to be implemented, member states should be prepared to share technology, manpower and commit an adequate budget for the plan's execution as well as for R&D programs.

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[209] Spezio, Ibid., p. 644.

VI.   EU AND NATO TEAM-WORK ENDEAVOR

The main goal of this thesis is to emphasize the need for the EU to take EW seriously. The creation of a joint doctrine for Electronic Warfare among the member states is an important step towards military effectiveness and success. However, since EU does not possess the financial and military resources to implement a project of this magnitude on its own, NATO's contribution and guidance in this area remains critical. Therefore, it is important to provide a quick review of the current relationship status between the EU and NATO, in order to identify areas of divergence and cooperation. The role of the United States will also be examined, since it maintains a dominant position in NATO's decision-making process. Finally, a review of the main dialogue events between the EU and NATO will show how this relationship has been progressed since the creation of the ESDP.

A.   AN AFFAIR "MADE IN EUROPE"

Established in 1949, based on Article 51 of the United Nations Charter[210], NATO provides the most complete military platform in terms of military capabilities and technology of the 21st century. Currently, the Alliance has 26 members, as shown in Table 6.1, out of which 19 are members of the EU. As described in NATO's handbook, refer to Table 6.2, the Alliance performs a wide range of security tasks focusing mainly in the Euro-Atlantic stability and well-being. The EU, in this matter, through its newly developed Security and Defense Policy covers an area that involves mainly crisis and humanitarian duties. It is apparent that the EU by implementing the ESDP concept has made a strong effort to build a solid European military identity and despite the reassurance that it will work in cooperation with NATO, there are areas that overlap and demand serious consideration.

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[210] NATO Handbook, p. 31, available at http://www.nato.int/docu/handbook/2001/index.htm, accessed 15 March 2004.

NATO Countries	EU Countries
1949: <u>Belgium</u>, Canada, <u>Denmark</u>, <u>France</u>, Iceland, <u>Italy</u>, <u>Luxemburg</u>, <u>Netherlands</u>, Norway, <u>Portugal</u>, <u>Britain,</u> US. **1952:** <u>Greece,</u> Turkey. **1955:** <u>West Germany</u>. **1982:** <u>Spain</u>. **1999:** <u>Czech Republic</u>, <u>Hungary</u>, <u>Poland.</u> **2004:** Bulgaria, <u>Estonia</u>, <u>Latvia</u>, <u>Lithuania</u>, Romania, <u>Slovakia</u> and <u>Slovenia</u>	**1958:** Germany, France, Italy, Belgium, Luxemburg, Netherlands. **1973:** Denmark, Ireland, Britain. **1981:** Greece. **1986:** Spain, Portugal. **1995:** Finland, Austria, Sweden. **2004:** Estonia, Slovenia, Latvia, Lithuania, Malta, Poland, Slovakia, Czech Republic, Hungary, Cyprus.
Total: 26	*Total: 25*
Note: Underlined NATO Countries are members of EU. Total of 19 out of the 26.	

Table 6.1.   NATO and EU Memberships

NATO Tasks	
Security:	To provide one of the indispensable foundations for a stable Euro-Atlantic security environment, based on the growth of democratic institutions and commitment to the peaceful resolution of disputes, in which no country would be able to intimidate or coerce any other through the threat or use of force.
Consultation:	To serve, as provided for in Article 4 of the Washington Treaty, as an essential transatlantic forum for Allied consultations on any issues that affect their vital interests, including possible developments posing risks for member's security and for appropriate coordination of their efforts in fields of common concern.
Deterrence and Defense:	To deter and defend against any threat of aggression against any NATO member state as provided for in Article 5 and 6 of the Washington Treaty.
Crisis Management:	To stand ready, case by case and by consensus, in conformity with Article 7 of the Washington Treaty to contribute to effective conflict prevention and to engage actively in crisis management including crisis response operations.
Partnership:	To promote wide-ranging partnership, cooperation, dialogue with other countries in the Euro Atlantic area, with the aim of increasing transparency, mutual confidence, and the capacity for joint action with the Alliance.[211]
EU Petersberg Tasks	
▪ Humanitarian and Rescue ▪ Peacekeeping ▪ Tasks of combat forces in crisis management, including peacemaking. ▪ Joint disarmament operations	

Table 6.2.   NATO Tasks vs. EU's Petersberg Tasks

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[211] NATO Handbook, Ibid.

The role of the United States in this relationship has always been decisive. During the 1990's, with the Europeans totally preoccupied by integration and economic growth, the United States shared more responsibilities and more risks in the global arena. As a result, the norms of behavior on which transatlantic relations were based were about to change. At this point, it is important to reveal that the transatlantic alliance "was never a relationship of equals"[212]. WWII considerably damaged Europe's economy and military infrastructure. Thus, the power imbalance was noticeable. However, the United States used to be very careful in projecting its power within Europe and NATO. More specifically, the alliance used to operate under certain unwritten rules, "the United States would consult and listen to its allies, seeking a measure of international or multilateral legitimacy before taking action"[213]. A glimpse into NATO's defense expenditures, as shown Figures 6.1 and 6.2, identifies the central financing role that the United States has played in the alliance. This role also accounts for the U.S. attitude as a "guarantor of European security"[214]. The figure also shows how NATO-Europe defense expenditures[215] have progressed since the 1980's. European contribution is still strong[216] but the United States remains the central pillar of this alliance increasing its financial contribution since the 1980's by 177.67%[217].

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[212] Philip H. Gordon and Jeremy Shapiro, Allies at War, McGraw-Hill, 2004, p. 24.

[213] Ibid.

[214] Leslie S. Lebl, "*European Union Defense Policy. An American Perspective,"* Policy Analysis, No. 516, Cato Institute, 24 June 2004, available at http://www.cato.org/pubs/pas/pa516.pdf, accessed 2 June 2004.

[215] Note that "NATO –Europe" includes contribution from countries, (i.e., Turkey, Norway, Iceland) that are not yet members of the European Community. However, more than 80% of the "NATO-Europe" contribution is made by EU countries.

[216] European-NATO since the 1980's raised their contribution by 78.64%. Data retrieved from http://www.nato.int/docu/pr/2003/p03-146e.htm, accessed 15 July 2004.

[217] Ibid.
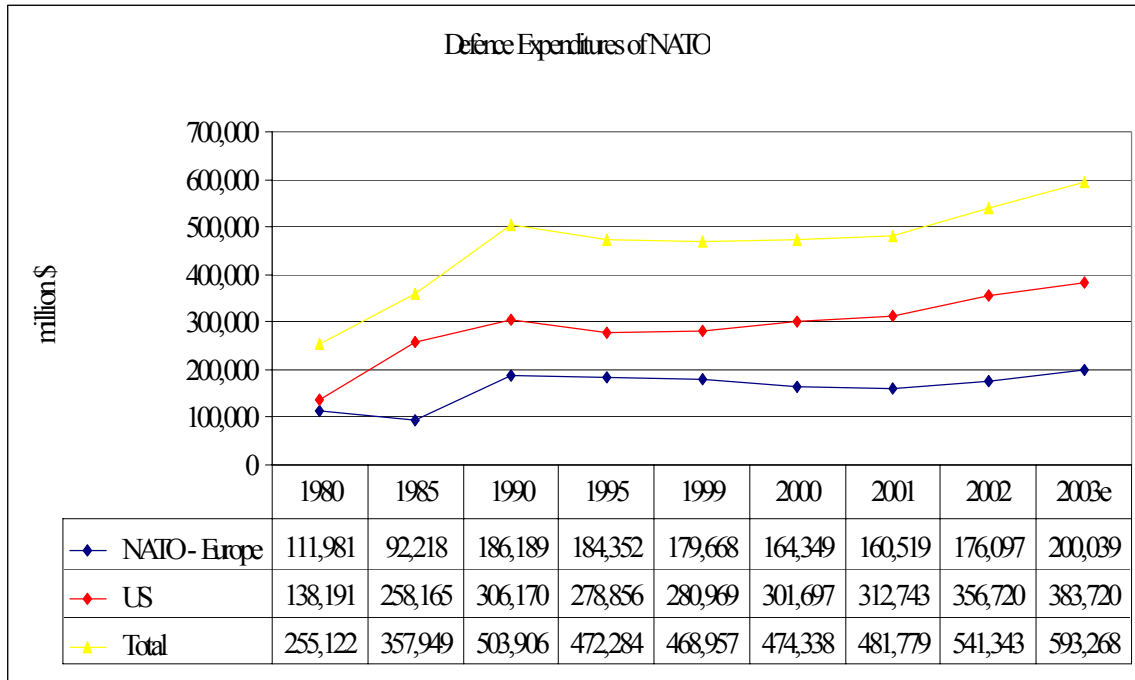
Figure 6.1. NATO Defense Expenditures[218]
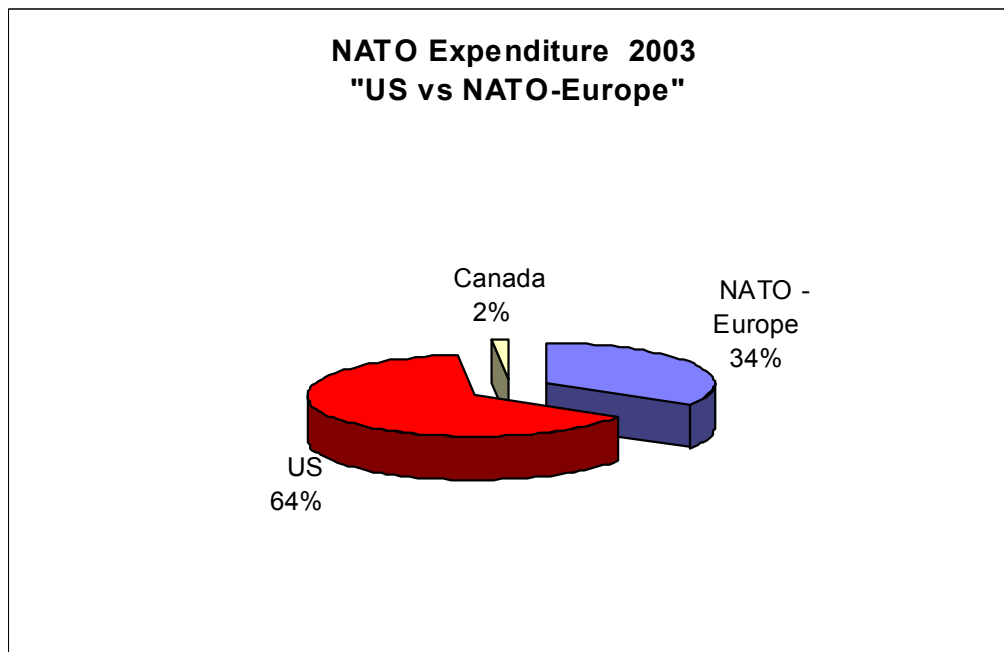
Figure 6.2. US vs. NATO-Europe "NATO Defense Expenditures in 2003"[219]

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[218] Data retrieved from http://www.nato.int/docu/pr/2003/p03-146e.htm, accessed 15 July 2004.

[219] Ibid.

B.   MILITARY CAPABILITIES - THE WEAK LINK

NATO's March 1999 intervention in Kosovo, clearly illustrated U.S. military supremacy and exposed EU's military deficiencies, showing how "gaps in defense spending and technology[220]" all these years have affected EU's military status. The U.S. monopolized operations and played a significant role in this major European issue. During the conflict, the U.S. demonstrated superiority in the areas of: (1) all weather delivery of precision guided munitions; (2) electronic warfare support and attack; (3) aerial refueling; (4) strategic lift; (5) Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR)[221].

The development of ESDP and the ECAP panels have tackled, within EU's budget framework, many of the areas. However, "European nations on the whole do not posses the political will to support the development of such power projection force at this time"[222] mainly because the success of the European integration has shifted the EU focus towards economic prosperity and not towards military supremacy.

There is, however, a paradox in this area. Table 6.3 shows the Annual average strength of EU countries that are NATO members while Figure 6.3 compares EU strength with U.S. military strength. It is evident that as a total, EU forces are dominant in numbers, but these numbers do not avow for EU's military superiority. They represent an old mentality that concentrates on human power but is lacking in technology. Today, EU efforts have been focused on the development of RRF and the battlegroups towards more flexible armed forces, but as a whole, the military reorganization of member states will require more energy and more budget than initially projected.

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[220] Samantha Paige Davis, Part IV, The ESDP and the Future of Transatlantic Relations, available at www.fsk.ethz.ch/documents/ Studies/volume_11/vol11_partIV.pdf.pdf, accessed 2 April 2004.

[221] Edward G. Gunning, Jr., *The Common European and Defense Policy ESDP*, USAF Institute for National Security Studies, USAF Academy, Colorado, INSS Occasional Paper 41, Regional Security Series, July 2001, p. 1, available at http://www.usafa.af.mil/inss/OCP/ocp41f.pdf, accessed 15 March 2004.

[222] Ibid., p. 18.

Figures, 6.4, 6.5, and 6.6 provide a broader view for the allocation of Defense Budget in major EU-NATO countries compared to the United States. It is obvious that the United States distributes its resources more evenly whereas EU countries, with the exception of the UK, have serious budget inequalities. A qualified explanation is that

> Having different perceptions, concepts, and a different geography, it is almost natural that Europe spends less than America on defense and has different budgetary options. Add to that the legacy of the Cold War, when the Europeans relied decisively on the Americans for the essence of their collective defense, thus leaving them key command-and-control and strategic capabilities, while providing manpower and land based assets that are of little use now.[223]

Country / Pays	1980	1985	1990	1995	1999	2000	2001	2002	2003e
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Military (thousand) / Militaires (millier)									
Belgium	108	107	106	47	42	42	41	42	42
Czech Republic					54	52	49	40	35
Denmark	33	29	31	27	27	24	22	22	22
France	572	560	548	502	420	394	366	355	356
Germany	490	495	545	352	331	319	306	295	285
Greece	186	201	201	213	204	205	202	209	203
Hungary					51	50	49	44	45
Italy	474	504	493	435	391	381	374	362	325
Luxembourg	1	1	1	1	1	1	1	1	1
Netherlands	107	103	104	67	54	52	51	52	53
Poland					187	191	178	159	150
Portugal	88	102	87	78	71	68	68	69	68
Spain	356	314	263	210	155	144	151	135	135
United Kingdom	330	334	308	233	218	218	215	214	214
NATO - EU	*2745*	*2751*	*2688*	*2166*	*2206*	*2141*	*2073*	*1999*	*1932*

Table 6 : Armed forces - Annual average strength
Tableau 6 : Forces armées - Effectif annuel moyen

Table 6.3. Armed Forces Annual Strength[224]

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[223] Gustav Lindstrom (ed.), "Shift or Rift," Assessing US-EU relations after Iraq, European Union Institute for Security Studies, Transatlantic Book 2003, October 2003, p. 78, available at http://www.iss-eu.org/chaillot/bk2003.pdf, accessed 15 March 2004.

[224] From http://www.nato.int/docu/pr/2003/p03-146e.htm, accessed 15 July 2004.

Military Forces Annual Avg Strength

	1980	1985	1990	1995	1999	2000	2001	2002	2003e
United States	2,050	2,244	2,181	1,620	1,486	1,483	1,487	1,506	1,496
NATO - EU	2,745	2,751	2,688	2,166	2,206	2,141	2,073	1,999	1,932

Military (thousands)
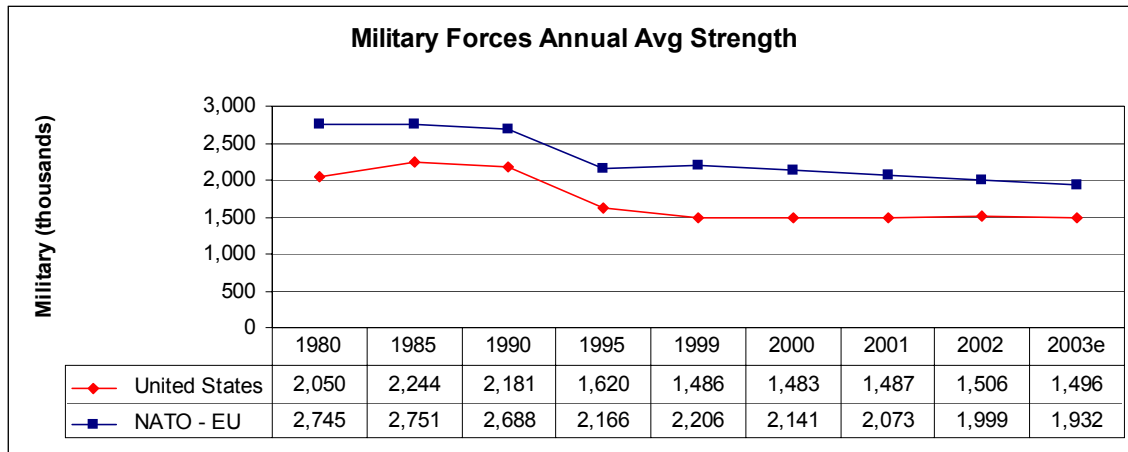
Figure 6.3. Military Forces Annual Strength[225]

1. Asymmetrical Structures

The allocation of defense budget differs among EU member states, but remains at relatively high levels with respect to personnel. European countries, with the exception of the UK, dedicate a range that varies from 48% up to 80% of personnel expenditures while leaving equipment expenditures at low levels. Refer to Figures 6.4, 6.5 and 6.6. These figures clearly need reevaluation within the ESDP spirit.

Equipments expenditures have been a weak link among NATO member states. "Europeans have been schooled by history, up to and including the Cold War, to equate security with territorial integrity and to gauge threats in proportion to their geographic proximity"[226]. With the absence of a real enemy, the need to acquire high tech weapons or to invest in military R&D programs has been a secondary issue for many decades. However, recent high intensity conflicts proved that the U.S.-European military asymmetry is not an effective strategy for facing threats in the 21st century. Today, the EU is keener than ever to become a guarantor force and strengthen global security. Driven by multilateralism, which is in the foundation of Union, European States need to take advantage of their experience with NATO and promote an integrated command.

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[225] Data retrieved from Ibid.

[226] Gustav Lindstrom, Ibid., p. 50.

On these grounds, cooperation with key NATO countries such as the United States could prove very helpful, especially when the sharing of military capabilities is involved.

Personnel Expenditure

	Average 1990 - 1994	Average 1995 - 1999	1999	2000	2001	2002	2003e
Belgium	68.3	69.3	68.4	65.8	68.7	71.5	72.1
Czech Republic			46.9	42.8	46.0	45.5	48.6
Denmark	57.5	59.8	60.0	54.6	52.3	52.0	49.2
France		58.2	60.3	60.4	60.5	60.7	58.8
Germany	57.4	61.5	59.8	60.7	60.3	59.4	60.4
Greece	63.0	61.7	61.4	62.5	64.0	67.6	69.0
Hungary			46.7	48.7	47.9	49.3	48.7
Italy	63.6	71.8	74.0	71.4	72.3	74.0	73.7
Luxembourg	76.2	79.1	76.1	76.0	68.4	66.7	69.2
Netherlands	56.9	54.6	49.8	50.8	48.0	51.2	52.3
Poland			62.4	62.3	64.3	64.9	64.4
Portugal	77.3	80.8	83.2	81.8	80.8	84.1	80.2
Spain	64.9	66.5	66.0	63.9	63.4	62.4	61.7
United Kingdom	42.2	39.4	37.9	38.2	38.7	40.0	39.7
United States	39.3	39.0	38.1	37.7	36.2	36.1	35.3

Figure 6.4.   Personnel Expenditures[227]

[227] Data from Table: Total Defense Expenditure per NATO Country. Data retrieved from http://www.nato.int/docu/pr/2003/p03-146e.htm, accessed 15 July 2004.

Equipment Expenditure

	Average 1990 - 1994	Average 1995 - 1999	1999	2000	2001	2002	2003e
Belgium	7.8	5.8	6.5	5.8	7.1	7.1	5.2
Czech Republic			16.3	22.5	20.3	17.5	21.0
Denmark	15.8	12.8	11.4	14.8	16.8	13.5	18.0
France		21.3	19.4	18.9	19.4	19.1	20.6
Germany	13.5	11.8	13.2	13.5	14.0	14.1	14.0
Greece	22.8	20.1	19.4	17.8	15.2	13.1	12.7
Hungary			21.0	12.4	10.5	11.1	10.2
Italy	16.3	12.9	11.7	14.3	10.3	12.4	12.7
Luxembourg	3.4	4.1	5.0	4.6	12.1	19.7	17.1
Netherlands	15.6	16.4	16.9	17.0	16.7	15.9	17.1
Poland			11.1	8.8	8.8	11.1	14.4
Portugal	5.7	5.5	4.2	6.4	5.3	4.1	7.3
Spain	12.4	12.8	11.5	12.9	12.7	12.8	11.8
United Kingdom	21.0	24.8	26.9	25.7	24.2	23.6	23.5
United States	25.1	26.2	24.9	21.9	25.7	27.4	27.6

Figure 6.5.   Equipment Expenditures[228]

[228] Ibid.

Other Expenditure

	Average 1990 - 1994	Average 1995 - 1999	1999	2000	2001	2002	2003e
Belgium	20.4	21.0	21.4	26.5	20.4	18.8	20.0
Czech Republic			29.8	31.5	29.1	30.9	26.2
Denmark	23.3	25.2	26.6	29.3	28.2	30.8	30.0
France		16.4	15.9	16.2	15.6	16.0	15.8
Germany	23.9	21.9	21.9	20.9	21.3	22.1	21.1
Greece	12.2	16.2	17.2	17.9	19.4	18.1	17.0
Hungary			28.3	36.1	35.9	33.2	33.9
Italy	17.7	14.3	13.5	13.1	16.4	12.8	12.6
Luxembourg	9.4	12.0	12.1	14.5	11.6	11.0	11.4
Netherlands	22.1	24.7	29.6	27.8	31.1	29.2	26.8
Poland			25.1	27.1	24.6	22.3	18.6
Portugal	13.8	12.3	12.0	10.3	13.2	11.0	11.6
Spain	21.2	19.7	20.8	21.4	21.7	22.4	24.2
United Kingdom	30.5	30.5	30.1	31.7	36.1	35.6	35.9
United States	33.6	32.5	35.1	38.7	36.5	35.1	35.5

Figure 6.6.   Other Expenditures, (including R&D), as Part of the Total Defense Expenditure per NATO Country[229]

2.   A Promising Example

The UK, as the United States, has maintained a better balance over the years. Not only has it managed the budget better, as demonstrated by Figure

[229] Ibid.

6.7, but also has explored NATO's interoperability more than any other EU country. It is also obvious that while the UK has managed to differentiate, Germany and France followed parallel roads in military spending.
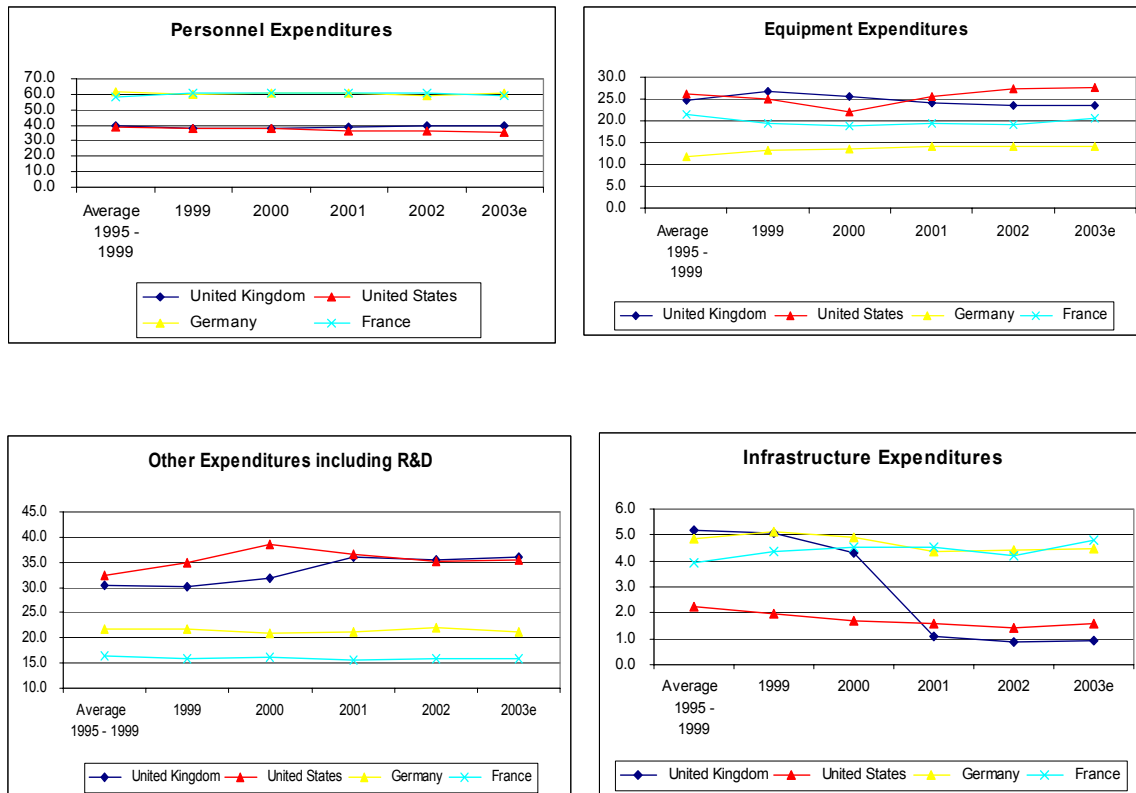
Figure 6.7.   Combination Figures[230]

U.S. Major Robert L. McPeek[231], who was assigned to the 14th Signal British Regiment, reveals from his experience how the British have advanced in teamwork and expertise.

> The 14th Signal Regiment is a leader in developing training and exercising opportunities with other NATO EW units. It has established and maintained relations with the U.S. 103d MI Battalion, the Royal Netherlands Army's 102d EW Company, the Royal Danish Army's EW Company LANDZEALAND, and the German Army's 320th Fernmelderegiment. U.S. MI personnel can

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[230] Ibid.

[231] A deputy team chief at the U.S. Transportation Command's Joint Intelligence Center at Scott Air Force Base. Electronic Warfare British Style. Major Robert L. McPeek, available at http://www.fas.org/irp/agency/army/tradoc/usaic/mipb/1996-1/mcpeek2.htm, accessed 6 July 2004.

learn much from their experiences. We can reap great dividends by continuing and expanding multinational training opportunities with the NATO EW units like the 14th Signal Regiment.[232]

He concludes with

Knowledge is a very powerful tool when used correctly. As future military operations take on more of a multinational structure, it becomes imperative that we know more about the doctrine, tactics, and systems of our NATO Allies. Now is the time to learn and exchange vital information as it will be too late once we deploy in NATO or coalition operations.[233]

C.   EU –NATO DIALOGUE

In an effort to face the inevitable, (i.e., the development of ESDP) and unravel emerging arguments and misunderstandings, NATO in cooperation with the United States and EU-NATO countries, has initiated a dialogue that tries to establish boundaries and promotes cooperation.   Table 6.4 highlights the progress in this dialogue, starting with the 1994 NATO Brussels Summit in which an effort to satisfy European trends for autonomy by introducing the concept of European Security and Defense Identity (ESDI) within the alliance, was initiated.

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[232] Electronic Warfare British Style. Major Robert L. McPeek, available at http://www.fas.org/irp/agency/army/tradoc/usaic/mipb/1996-1/mcpeek2.htm, accessed 6 July 2004.

[233] Ibid.

EU-NATO Dialogues and Documents	
Brussels… 1994	NATO Brussels Summit
Berlin, 3 June 1996	Berlin Plus Agreement
Washington DC, 24 April 1999,	North Atlantic Council Summit
Cologne, 3-4 June 1999	Cologne Summit
Helsinki, 10-11 December 1999	EU Helsinki Council
Santa Mara de Feira, 19-20 June 2000	European Council Summit
Prague, November 2002	NATO Prague Summit
Copenhagen, 12-13 December 2002	Copenhagen Summit
Brussels, 18 June 2004	Brussels European Council Presidency Conclusions
15 June 2004	10596/04 Report "European Defense: NATO/EU consultation, planning, and operations"
Dromoland Castle, 26 June 2004	EU-US Declaration on Combating Terrorism

Table 6.4.   EU-NATO Dialogue

In Berlin, NATO identified "three objectives that would improve the Alliance capability to improve its roles"[234]. The first was to "ensure the Alliance's military effectiveness" the second was to "preserve the transatlantic link" and the third was "the development of the European Security and defense Identity within the Alliance"[235]. In addition, the third objective was reinforced with the ability for "WEU[236]-led operations to use "separable but not separate NATO assets and capabilities"[237].

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[234] Ministerial Meeting of the North Atlantic Council, Berlin, 3 June 1996. Article 7.

[235] Ibid.

[236] "In 1997, with the signature of the Amsterdam Treaty, the condition of the Western European Union (WEU) as an integral part of the EU was reaffirmed." Alfredo Chamorro Chapinal, "The Security and Defense of Europe in the 21st Century-(NATO, WEU, OSCE), Final Report," Madrid, May 2000, p. 48, available at http://www.nato.int/acad/fellow/98-00/chamorro.pdf, accessed 3 March 2004.

[237] Ibid.

Following the British-French Summit at St Malo[238], 3-4 December 1998, it became clear that EU trends have matured towards developing more than a strong identity within NATO. The preannouncement of ESDP was more like an omen that was fulfilled. The reaction to St. Malo came with an article published in the London Financial Times, 7 December 1998. In this article, the U.S. Secretary of State Madeleine Albraight "advised that the Europeans should try to skirt three potential dangers in relation with NATO: a) the strategic *De-linking*; b) the *Duplication* of force Structures; c) the Discrimination among interested European states."[239]

At the NATO Washington Summit, on 24 April 1999, the EU "won a number of key concessions from the US. As the communiqué stated, NATO capabilities were to be put at the disposal of EU"[240]. In addition, in the Cologne Summit, 3-4 June 1999, the EU announced that "the EU would try to give itself the means for direct military action within the spectrum of the Petersburg Tasks with or without the use of NATO assets, but has no intention to take under its responsibility the main missions of NATO"[241]. On 18 October 1999, an important step was made towards cooperation, with the designation of Javier Solana, former Secretary General of NATO, "as High Representative for EU Common Foreign and Security matters, Secretary General of the European Council and at the same time Secretary General of the Western European Union[242]". The EU concluded that year, with the European Council at Helsinki 10-11 December 1999, with the introduction of HG 2003, and the ESDP set its first objectives.

The NATO EU relationship was once again at the forefront of the European Council Summit at Santa da Feira, 19-20 June 2000. At the Summit, it

[238] Refer to Chapter II, p. 16.

[239] Alfredo Chamorro Chapinal, Ibid., p. 88.

[240] Giovanna Bono, European Security and Defense Policy: Theoretical Approaches, the Nice Summit and Hot Issues, p. 31, available at http://www.bits.de/CESD-PA/esdp02.pdf, accessed 15 March 2004.

[241] Alfredo Chamorro Chapinal, Ibid., p. 90.

[241] Ibid.

[242] Ibid.

was announced that "four ad hoc working groups were to be set up on the capabilities goal and to prepare the ground for permanent arrangements between the two organizations"[243]. Two years later, the Prague NATO Summit

> reiterated the value of the strategic partnership between NATO and the European Union. Both are not just compatible but are indeed necessary partners in the security and defense field. Of course this requires a major European effort to develop the necessary military capabilities, both within NATO and through the EU's HG which are mutually reinforcing processes[244].

That December at the Copenhagen Summit, "a significant turning point was made in the evolution of the fledging ESDP with a breakthrough on the use of NATO planning and military assets by the EU- so called Berlin Plus arrangements"[245].

The most recent developments in this issue came this summer at the Brussels European Council, 17-18 June 2004,

> The European Council welcomed the report (doc no 10596/04 of 15 June 2004) by the Secretary-General/High Representative on the progress so far in taking forward the proposals in the document "European defence: NATO/EU consultation, planning and operations", which was welcomed by the European Council in Brussels in December 2003. The European Council reaffirmed the importance of these measures coming into force as soon as possible and of the necessary resources being provided as a matter of priority.

> The European Council agreed to take forward work on the establishment of a civilian/military cell within the EU Military Staff, as set out in the abovementioned report, and agreed that the cell should begin its work at the latest by the end of this year.

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[243] Giovanna Bono, Ibid., p. 33.

[244] Wesley K. Clark, Max Cleland, Chas. W. Freeman, Jr. and Gordon Smith, C. Richard Nelson, Robert L. Hutchings (Atlantic Council Policy Papers), Permanent Alliance? NATO's Prague Summit and Beyond. available at http://www.acus.org/Publications/policypapers/internationalsecurity/permanent Alliance.pdf, accessed 23 March 2004.

[245] Gerrard Quille, Making European Defense Work: Copenhagen, Berlin Plus and ECAP. Number 16, February 2003 European Security Review, available at http://www.isis-europe.org/ftp/download/making%20eu%20defence%20work%20-%20esr%2015.pdf, accessed 24 May 2004.

The European Council agreed to take forward work on the establishment of a small EU cell at SHAPE and NATO liaison arrangements with the EUMS, as set out in the abovementioned report, and invited the SG/HR to contact the NATO Secretary-General with the aim of securing early agreement, entering into force by the end of this year[246].

The air of cooperation was reinforced by the EU-U.S. Declaration on Combating Terrorism at Dromoland Castle, on 26 June 2004. the EU and the Untied States affirmed that "will take forward work on counterterrorism, in keeping the following objectives, through dialogue and actions at all levels":

- We will work together to deepen the international consensus and enhance international efforts to combat terrorism.

- We reaffirm our total commitment to prevent access by terrorists to financial and other economic resources.

- We commit to working together to develop measures to maximise our capacities to detect, investigate and prosecute terrorists and prevent terrorist attacks.

- We will seek to further protect the security of international transport and ensure effective systems of border control.

- We will work together to develop further our capabilities to deal with the consequences of a terrorist attack.

- We will work in close cooperation to diminish the underlying conditions that terrorists can seize to recruit and exploit to their advantage.

- We will target our external relations actions towards priority Third Countries where counter-terrorist capacity or commitment to combating terrorism needs to be enhanced[247].

Today, the EU and NATO have established an agenda of cooperation in which the division of labor and sharing military capabilities play a dominant role. However, this agenda shows that European and U.S. forces could and should develop complementary rather than following parallel roads. Those who

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[246] Council of European Union, Brussels European Council, 17 and 18 June 2004. Presidency Conclusions. European Defense: NATO/EU Consultation, Planning & Operations, Paper 10679/04, available at http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/ec/81035.pdf, accessed 7 July 2004.

[247] EU-US Declaration on Combating Terrorism, Dromoland Castle, 26 June 2004, Paper 10760/04 (Presse 205), available at http://www.eurunion.org/partner/summit/Summit0406/2004SumTerror.pdf, accessed 7 July 2004.

forecasted the dissolution of NATO through the development of ESDP have been disappointed, as the future shows that this relationship is far from ending. Moreover, the EU is still under integration process and as Figure 6.8 clearly illustrates, emphasis is on Economic development and internal structures. The budget allowed for CFSP, in which ESDP falls, and is only 5% (i.e., external actions). Defense spending is hard to increase, even at national levels, as EU public opinion for many years tends to view the EU as a potential global economic power and not as a military counter balance actor. Therefore, it is important to promote cooperation with NATO and share military capabilities.

However, Europeans must undergo a transformation in defense spending. The defense budgets of key member states show that they need to spend better, not harder. More specifically, member states will have to:

- reduce personnel and other related costs and reinvest the savings into equipment and R&D.

- be committed to reshaping their military structures from large standing, conscript-based, mechanized armies to smaller deployable ones.

- enhance cooperation in defense spending within the EU and NATO. As Klaus Naumann points out, "The EU itself should organize common procurement of assets such as aircraft for transport and air-to-air refueling. These purchases should be made through a common EU fund to which all member-states would contribute."[248] Such European cooperation is already underway through the Airbus A400M transport aircraft program; however, it should be formalized and extended to other military capabilities as well.[249]

- Lastly, EU member states will have to support the findings of the ECAP Panels financially and allow ECAP to address issues such as the long-term development of EW.

The road ahead for European defense lies in transforming the European mentality in defense spending. "A more capable European partner will provide

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[248] Klaus Naumann, "Europe's Military Ambitions," *Center for European Reform Bulletin*, Iss. 12, June/July 2000.

[249] Airbus Military, "A400M Programme," Available at: http://www.airbusmilitary.com/home.html, accessed 4 June 2004.

flexibility and strength to the transatlantic security relationship"[250]. However, as the CFSP high representative, Javier Solana, stated in the Brussels informal meeting of Defense Ministers on April 2004:

> Success or failure is in your hands. I am convinced that the timelines can be met- but only if you, the Defense Ministers, put your weight behind the effort, and insist that self restrain is exercised all round, and that a spirit of compromise prevails[251].

2004 Budget Allocation per Category
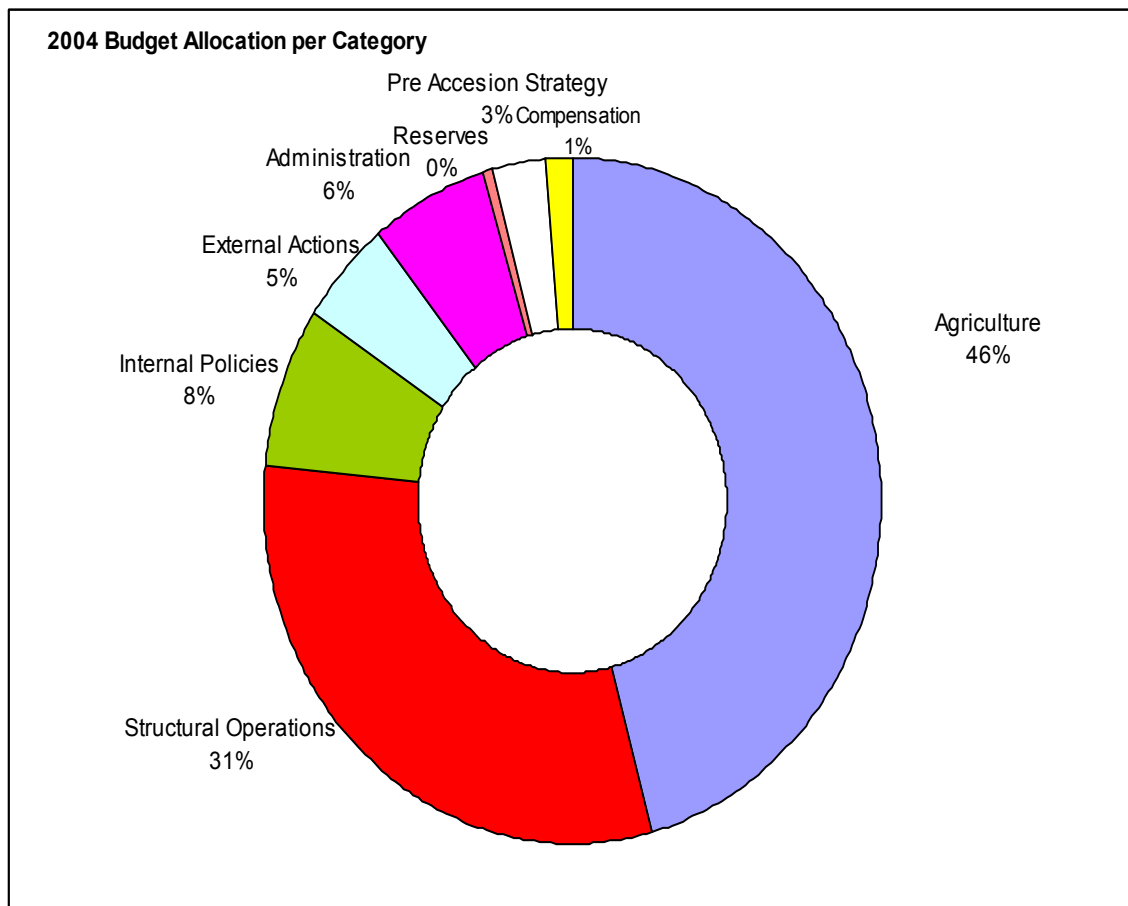
Figure 6.8.   EU 2004 Budget Allocation Per Category[252]

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[250] Edward G. Gunning, Jr., Ibid., p. 37.

[251] EU High Representative for the CFSP, at the Informal Meeting of Defense Ministers, Brussels, 5-6 April 2004, p. 3, available at http://ue.eu.int/ueDocs/cms_Data/docs/pressdata/EN/discours/79815.pdf, accessed 7 July 2004.

[252] Data from: Directorate – General for Budget. European Commission. *General Budget of the European Union for the Financial Year 2004*. The Figures. SEC(2004)- EN. April 2004.

VII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The European Union entered the 21st century with the ambition to create a military defense capability to augment its already well-established political institutions. The European Defense and Security Policy were launched in 1999 as an indivisible part of the Common Foreign and Security Policy, the EU's second pillar. ESDP was created to "provide the Union with an operational capacity drawing on assets civil and military"[253], in order to implement the Petersburg Tasks. The purpose of this thesis has been to demonstrate the perspectives for the development of ESDP and stress the need to consider EW a critical military and technological capability. Thus, this thesis concluded:

- EU is highly motivated in playing a significant role in the global arena and addressing unanimously and autonomously security threats.

- The creation of ESDP along with the development of military and political structures such as the Political Security Committee (PSC), the European Union Military Committee (EUMC), and the European Union Military Staff EUMS, confirms the Union's determination to set and meet military objectives within the EU's financial limits.

- Headline Goals 2003, the EU's first objectives within the framework of ESDP, addressed many military deficiencies. The ECAP panels, designed to find solutions, are still under revisions.

- Within the ECAP panels' framework, EW, an important military asset especially where medium and high intensity conflicts are involved, is not addressed, although its role in Command and Control is crucial for any mission.

- Despite the initial difficulties, EU has managed by 2003 to initiate threes missions: in Bosnia Herzegovina, the Former Yugoslav Republic of Macedonia (FYROM) and the Democratic Republic of Congo. The results have been satisfactory but did not avow for the EU's military autonomy.   The FYROM mission relied on the strategic partnership with NATO based on the Berlin-Plus agreement.

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253 Martin Ortega, Ibid., Chapter II.

- Headline Goals 2010, the EU's latest objectives introduced in the Brussels European Council, 17-18 June 2004, address interoperability, flexibility, and mobility as key elements in the structure of the European Forces and introduce a new military elite force, the Battle Groups.

- Although the EU stresses military autonomy, in the Conflict Cycle[254], the gap in military assets and deficiencies related to interoperability do not provide the impetus for high intensity conflicts. NATO has become an expert mainly due to assets shared by the U.S. forces, one of which is EW in this area.

- EW remains a significant component of Command and Control (C2). EW systems during training improve and substantiate the decision making-process while in the battlefields, when applied effectively, disarray an enemy commander from his/her forces. NATO has implemented the EW concept since 1966, establishing the Electronic Warfare Advisory Committee (NEWAC) that year.

- In an effort to illustrate how modern EW tools could be used to provide a competitive advantage in the battlefield, the IMOM model was introduced and utilized to run in an imaginary scenario under the name "Save Atlantia 2008". The results clearly have shown the effectiveness of this program.

- If EW tools are expensive to develop in the short term, then the very best thing for the EU is to cooperate within the NATO framework. NATO has identified over the years the Union's need to develop a strong identity within and out of the Alliance. A dialogue has been initiated and both parties have realized that cooperation is the key ingredient for the success and the survival of the transatlantic relationship.

- Defense ambitions in the EU do not correlate with Defense spending. Given the potential of the projects handled by the ECAP panels and the global threat environment, defense budgets ought to be increased. However, domestic social pressures in Europe, derived mainly by the integration process that coached EU citizens to care for economic prosperity and not for military superiority, it is unlikely that EU members will fulfill their defense ambitions with increased appropriations.

- Transforming the defense spending, spend better not more, is a more promising strategy. EU countries must restructure their militaries in order to reduce personnel costs and transfer those savings into equipment and R&D investments.

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[254] Refer to Chapter III.

- Within the EU, the UK has managed to follow the US's defense allocation norms. It also has valuable experience concerning interoperability and has developed useful military assets, including EW tools. Other European leading nations, such as France or Germany, with vital military industry, hold a lot of potential for the EU's military advancement but their defense spending is a drawback.

- Finally, it is concluded that EW plays a vital role in the development of ESDP. It will provide RRF and the Battle Groups with an enormous advantage and the ability to increase effectiveness during operations. Therefore, it is important for the time being to rely in NATO's assets and cooperation. but in the long term. it is imperative for EU forces to rely on their own assets.

The EU to date has shown a determination to implement an effective ESDP. However, as Nicolas Machiavelli stated 500 years ago, "a policy is not defined by its excellence but by its outcome"[255]. The outcome of this effort is yet to be determined, but for the moment, it looks very promising.

B. RECOMMENDATIONS

There are many recommendations the EU could follow in embracing EW as a military capability that needs to be developed in the long term. Following NATO's footsteps in this area is always a good starting point. The following list emphases areas in which ESDP should pay initial attention.

- Organize the EU's RRF to plan and execute Electronic Warfare.

- Develop a RRF Joint Operational Doctrine for Electronic Warfare.

- Increase the Interoperability with NATO assets.

- Establish an EW exercise planning policy and EW activities.

- Examine the multinational aspects of EW.

- Procure a certain number of available automated planning tools.

- Increase the defense expenditures-limit the equipment procurement.

- Last but not least, the EU's member-states contributions in EW personnel and assets should become a commitment.

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[255] Robert Kaplan, "Warriors Politics," Why Leadership Demands a Pagan Ethos, Random House 2002, p. 60.

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APPENDIX A. IMOM ROUTE REPORT/NPS/SUMMER 2004/THESIS RESEARCH/"SAVE ATLANTIA 2008"/BY MAJ ILIAS PANAGOPOULOS

UNCLASSIFIED/

SOJ Scenario =

SOJ Site: ALQ-99(1) at 382252N 0214955E, 175.0 Degrees, 16000.0 Feet MSL

Station NPS1   Ant Direction: 348.9 Degrees,   Ant Elevation: -10.0 Degrees

Station NPS10_HIGH   Ant Direction: 35.8   Degrees,   Ant Elevation: 0.0 Degrees

Station NPS11_LOW   Ant Direction: 13.1   Degrees,   Ant Elevation: 0.0 Degrees

Station NPS12_HIGH Ant Direction: 345.2 Degrees,   Ant Elevation: 0.0 Degrees

Station NPS13_LOW   Ant Direction: 338.0 Degrees,   Ant Elevation: 0.0 Degrees

Station NPS14   Ant Direction: 35.8   Degrees,   Ant Elevation: 0.0 Degrees

Station NPS14   Ant Direction: 348.1 Degrees,   Ant Elevation: 0.0 Degrees

Station NPS15   Ant Direction: 13.6   Degrees,   Ant Elevation: 0.0 Degrees

SOJ Site: ALQ-99(2) at 371911N 0223457E, 206.0 Degrees, 15000.0 Feet MSL

Station NPS16_HIGH   Ant Direction: 11.0   Degrees,   Ant Elevation: 0.0 Degrees

Station NPS18   Ant Direction: 26.2   Degrees,   Ant Elevation: 0.0 Degrees

Station NPS2_HIGH   Ant Direction: 350.5 Degrees,   Ant Elevation: 0.0 Degrees

Station NPS25_LOW   Ant Direction: 16.0   Degrees,   Ant Elevation: 0.0 Degrees

Station NPS23_LOW   Ant Direction: 352.1 Degrees,   Ant Elevation: 0.0 Degrees

Station NPS4_HIGH   Ant Direction: 24.7   Degrees,   Ant Elevation: 0.0 Degrees

Station NPS8_HIGH   Ant Direction: 358.0   Degrees,   Ant Elevation: 0.0 Degrees Station

NPS9_LOW   Ant Direction: 115.6 Degrees,   Ant Elevation: 0.0 Degrees

Station NPS4_HIGH   Ant Direction: 13.7   Degrees,   Ant Elevation: 0.0 Degrees

SPJ: [No SPJ]

Route: Route ESDP Sample ID: 1, Leg Number: 1

   Aircraft Altitude: 2000.0 Feet AGL

   Aircraft Heading: 260.6 Degrees

   Aircraft Velocity: 400.00 Knots

   Turnpoint Symbol: None

   Position Spacing: 10.0 NM

   Position Number: 1 at 383148N 0231603E   Position Status: Terrain Masked

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   Position Number: 2 at 383008N 0230328E   Position Status: Terrain Masked

----

   Position Number: 3 at 382827N 0225053E   Position Status: Terrain Masked

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   Position Number: 4 at 382645N 0223819E   Position Status: Terrain Masked

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Position Number: 5 at 382607N 0223339E

Position Status: Search Radar Detected[256]

   Contributing Site(s):

   Eqp. Code: TPS-43EW (2)   **Site Status: Search Radar Detected**

NATO Name: EW STACKED BEAM RADAR   ELNOT: Q0058   Function: EW

     Location: 375945N 0215933E   Postion: 11 o'clock   Elevation: -0.4 degrees

     Range: 38.3 NM   Terrain Masking Alt: 482 Feet AGL / 4016 Feet MSL

Route: Route ESDP Sample ID: 1, Leg Number: 2

   Aircraft Altitude: 2000.0 Feet AGL

   Aircraft Heading: 245.5 Degrees

   Aircraft Velocity: 450.00 Knots

   Turnpoint Symbol: None

   Position Spacing: 10.0 NM

   Position Number: 6 at 382156N 0222204E   Position Status: Terrain Masked

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[256] Explanation: In position 5, the aircraft is detected at the specific coordinates provided by the system. More information about the type of the threat are given (i.e., TPS-43), its location, its position, its elevation and its range in reference to the target, which has been detected flying at 2000 ft. At the end, the system suggests a change in altitude, from 2000 ft to 482 ft Above Ground Level (AGL) or 4016 ft Mean Sea Level (MSL), in order to avoid detection. Also, in the above location, the jammer used was ineffective.

Position Number: 7 at 381745N 0221030E   Position Status: Terrain Masked

----

Position Number: 8 at 381647N 0220751E   Position Status: Terrain Masked

----

Route: Route ESDP Sample ID: 1, Leg Number: 3

Aircraft Altitude: 2000.0 Feet AGL

Aircraft Heading: 229.6 Degrees

Aircraft Velocity: 480.00 Knots

Turnpoint Symbol: None

Position Spacing: 10.0 NM

Position Number: 9 at 381017N 0215811E

Position Status: Search Radar Detected

Contributing Site(s):

Eqp. Code: TPS-43EW (2)   Site Status: Search Radar Detected

NATO Name: EW STACKED BEAM RADAR   ELNOT: Q0058   Function: EW

Location: 375945N 0215933E   Postion: 10 o'clock   Elevation: -0.9 degrees

Range: 10.8 NM   Terrain Masking Alt: 1052 Feet AGL / 4785 Feet MSL

Position Number: 10 at 380345N 0214832E   Position Status: Terrain Masked

----

Position Number: 11 at 375713N 0213856E   Position Status: Terrain Masked

----

Position Number: 12 at 375041N 0212921E   Position Status: Terrain Masked

----

Position Number: 13 at 374912N 0212711E   Position Status: Terrain Masked

----

Route: Route ESDP Sample ID: 1, Leg Number: 4

Aircraft Altitude: 2000.0 Feet AGL

Aircraft Heading: 151.1 Degrees

Aircraft Velocity: 480.00 Knots

Turnpoint Symbol: None

Position Spacing: 10.0 NM

Position Number: 14 at 374025N 0213318E   Position Status: Terrain Masked

----

Position Number: 15 at 373138N 0213922E   Position Status: Terrain Masked

----

Position Number: 16 at 372251N 0214525E   Position Status: Terrain Masked

----

Position Number: 17 at 371734N 0214903E   Position Status: Terrain Masked

----

Route: Route ESDP Sample ID: 1, Leg Number: 5

Aircraft Altitude: 2000.0 Feet AGL

Aircraft Heading: 133.0 Degrees

Aircraft Velocity: 480.00 Knots

Turnpoint Symbol: None

Position Spacing: 10.0 NM

Position Number: 18 at 371043N 0215813E   Position Status: Terrain Masked

----

Position Number: 19 at 370351N 0220720E

Position Status: Weapon Lethal

Contributing Site(s):

Eqp. Code: GAINFUL (4)   **Site Status: Weapon Lethal**

NATO Name: GAINFUL   ELNOT: Function: AAA

Location: 370322N 0221055E   Postion: 11 o'clock   Elevation: -3.6 degrees

Range: 2.9 NM   Terrain Masking Alt[257]: 0 Feet AGL / 761 Feet MSL

Position Number: 20 at 370209N 0220936E   Position Status: Terrain Masked

----

Route: Route ESDP Sample ID: 1, Leg Number: 6

Aircraft Altitude: 2000.0 Feet AGL

Aircraft Heading: 114.9 Degrees

Aircraft Velocity: 480.00 Knots

Turnpoint Symbol: None

Position Spacing: 10.0 NM

Position Number: 21 at 365755N 0222056E

Position Status: Search Radar Detected

Contributing Site(s):

---

[257] The suggested altitude is 0 ft. There is no way to avoid the threat in that position, simply by doing terrain masking. In this case, the user should either change the parameters of the jammer, or change the route at this point.

Eqp. Code: CW (1)   **Site Status: Search Radar Detected**

NATO Name: 6 BEAM EW   ELNOT: UN008   Function: EW

Location: 373815N 0222124E   Postion: 8 o'clock   Elevation: -1.6 degrees

Range: 39.5 NM   Terrain Masking Alt: 1119 Feet AGL / 7828 Feet MSL

Eqp. Code: TPS-43EW (2)   **Site Status: Search Radar Detected**

NATO Name: EW STACKED BEAM RADAR   ELNOT: Q0058   Function: EW

Location: 375945N 0215933E   Postion: 8 o'clock   Elevation: -1.0 degrees

Range: 63.9 NM   Terrain Masking Alt: 1732 Feet AGL / 8441 Feet MSL

Eqp. Code: TPS-70EW (3)   **Site Status: Search Radar Detected** NATO Name: EW

STACKED BEAM RADAR ultra low sidelobe

ELNOT: Q0058   Function: EW

Location: 370927N 0222613E   Postion: 9 o'clock   Elevation: -4.4 degrees

Range: 13.0 NM   Terrain Masking Alt: 436 Feet AGL / 7145 Feet MSL

Position Number: 22 at 365339N 0223214E

Position Status: Search Radar Detected

Contributing Site(s):

Eqp. Code: TPS-70EW (3)   Site Status: Search Radar Detected

NATO Name: EW STACKED BEAM RADAR ultra low sidelobe   \

ELNOT: Q0058   Function: EW

Location: 370927N 0222613E   Postion: 8 o'clock   Elevation: -0.3 degrees

Range: 17.1 NM   Terrain Masking Alt: 1 Feet AGL / 1094 Feet MSL

Position Number: 23 at 364923N 0224332E

Position Status: Search Radar Detected

Contributing Site(s):

Eqp. Code: TPS-70EW (3)   Site Status: Search Radar Detected

NATO Name: EW STACKED BEAM RADAR ultra low sidelobe

ELNOT: Q0058   Function: EW

Location: 370927N 0222613E   Postion: 7 o'clock   Elevation: 0.1 degrees

Range: 24.8 NM   Terrain Masking Alt: 0 Feet AGL / 43 Feet MSL

Position Number: 24 at 364620N 0225134E   Position Status: Terrain Masked

----

Route: Route ESDP Sample ID: 1, Leg Number: 7

Aircraft Altitude: 2000.0 Feet AGL

Aircraft Heading: 40.0 Degrees

Aircraft Velocity: 480.00 Knots

Turnpoint Symbol: None

Position Spacing: 10.0 NM

Position Number: 25 at 365400N 0225936E   Position Status: Terrain Masked

----

Position Number: 26 at 370140N 0230739E   Position Status: Terrain Masked

----

Position Number: 27 at 370919N 0231544E   Position Status: Terrain Masked

----

Position Number: 28 at 371658N 0232351E   Position Status: Terrain Masked

----

Position Number: 29 at 372436N 0233159E   Position Status: Terrain Masked

----

Position Number: 30 at 372855N 0233636E   Position Status: Terrain Masked

----

Route: Route ESDP Sample ID: 1, Leg Number: 8

Aircraft Altitude: 2000.0 Feet AGL

Aircraft Heading: 6.0 Degrees

Aircraft Velocity: 540.00 Knots

Turnpoint Symbol: None

Position Spacing: 10.0 NM

Position Number: 31 at 373853N 0233755E   Position Status: Terrain Masked

----

Position Number: 32 at 374852N 0233915E   Position Status: Terrain Masked

----

Position Number: 33 at 375850N 0234034E   Position Status: Terrain Masked

----

Position Number: 34 at 380501N 0234124E   Position Status: Terrain Masked

----

Route: Route ESDP Sample ID: 1, Leg Number: 9

Aircraft Altitude: 2000.0 Feet AGL

Aircraft Heading: 0.0 Degrees

Aircraft Velocity: 540.00 Knots

Turnpoint Symbol: None

Position Spacing: 10.0 NM

Position Number: 35 at 380526N 0234124E   Position Status: Terrain Masked

----

Route: Route ESDP Sample ID: 1, Leg Number: 10

Aircraft Altitude: 2000.0 Feet AGL

Aircraft Heading: 322.5 Degrees

Aircraft Velocity: 450.00 Knots

Turnpoint Symbol: Circle

Position Spacing: 10.0 NM

Position Number: 36 at 381322N 0233340E   Position Status: Terrain Masked

----

Position Number: 37 at 382119N 0232554E   Position Status: Terrain Masked

----

Position Number: 38 at 382914N 0231806E   Position Status: Terrain Masked

----

Position Number: 39 at 383212N 0231510E   Position Status: Terrain Masked

----

End of Route Summary.

IMOM Route Report: Sorted by Site / NPS/ SUMMER 2004/ THESIS RESEARCH / "SAVE ATLANTIA 2008"/ by Maj Ilias Panagopoulos

SOJ Scenario =

 SOJ Site: ALQ-99(1) at 382252N 0214955E, 175.0 Degrees, 16000.0 Feet MSL

 Station NPS1 Ant Direction: 348.9 Degrees,   Ant Elevation: -10.0 Degrees

 Station NPS10_HIGH Ant Direction: 35.8 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS11_LOW Ant Direction: 13.1 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS12_HIGH Ant Direction: 345.2 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS13_LOW Ant Direction: 338.0 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS14 Ant Direction: 35.8 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS14 Ant Direction: 348.1 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS15 Ant Direction: 13.6 Degrees,   Ant Elevation: 0.0 Degrees

 SOJ Site: ALQ-99(2) at 371911N 0223457E, 206.0 Degrees, 15000.0 Feet MSL

  Station NPS16_HIGH Ant Direction: 11.0 Degrees,   Ant Elevation: 0.0 Degrees

  Station NPS18 Ant Direction: 26.2 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS2_HIGH Ant Direction: 350.5 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS25_LOW Ant Direction: 16.0 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS23_LOW Ant Direction: 352.1 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS4_HIGH Ant Direction: 24.7 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS8_HIGH Ant Direction: 358.0 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS9_LOW Ant Direction: 115.6 Degrees,   Ant Elevation: 0.0 Degrees

 Station NPS4_HIGH Ant Direction: 13.7 Degrees,   Ant Elevation: 0.0 Degrees

SPJ: [No SPJ]

===

Route Name(s): Route ESDP / RRF/ Peloponnesus/ Greece

US Number: 1
  Eqp. Code: CW
  Location: 373815N 0222124E
  Nato Name: 6 BEAM EW
  Function: EW
  ELNOT: UN008

	Leg Route Detect					Altitude Heading
Velocity		Elevation	Range	Terrain Masking Alt		
Route Name	Num	Pt. #	Status	Location		(ft)
(deg)		(knots)	Position	(deg) (NM)	(AGL / MSL) ft	
Route ESDP S	6	21	Search Radar Detected	365755N 0222056E	2000.0 AGL	114.9
480.00	8 o'clock	-1.6	39.5	1119 / 7828		

US Number: 2
  Eqp. Code: TPS-43EW
  Location: 375945N 0215933E
  Nato Name: EW STACKED BEAM RADAR
  Function: EW
  ELNOT: Q0058

	Leg Route Detect				Altitude Heading Velocity
Elevation	Range	Terrain Masking Alt			
Route Name	Num	Pt. #	Status	Location	(ft)
(deg)	(knots)	Position	(deg) (NM)	(AGL / MSL) ft	
Route ESDP S	1	5	Search Radar Detected	382607N 0223339E	2000.0 AGL 260.6
400.00	11 o'cloc	-0.4	38.3	482 / 4016	
Route ESDP S	3	9	Search Radar Detected	381017N 0215811E	2000.0 AGL 229.6
480.00	10 o'cloc	-0.9	10.8	1052 / 4785	
Route ESDP S	6	21	Search Radar Detected	365755N 0222056E	2000.0 AGL 114.9
480.00	8 o'clock	-1.0	63.9	1732 / 8441	

US Number: 3

 Eqp. Code: TPS-70EW

 Location: 370927N 0222613E

 Nato Name: EW STACKED BEAM RADAR ultra low sidelobe

 Function: EW

 ELNOT: Q0058

| | Leg | Route | Detect | | Altitude | Heading | Velocity |
| Route Name | Num | Pt. # | Status | Location | Elevation (ft) | Range | Terrain Masking Alt |
(deg)		(knots)	Position	(deg) (NM)	(AGL / MSL) ft		
Route ESDP S	6	21	Search Radar Detected	365755N 0222056E	2000.0 AGL	114.9	
480.00		9 o'clock	-4.4	13.0	436 / 7145		
Route ESDP S	6	22	Search Radar Detected	365339N 0223214E	2000.0 AGL	114.9	
480.00		8 o'clock	-0.3	17.1	1 / 1094		
Route ESDP S	6	23	Search Radar Detected	364923N 0224332E	2000.0 AGL	114.9	
480.00		7 o'clock	0.1	24.8	0 / 43		

 US Number: 4

 Eqp. Code: GAINFUL

 Location: 370322N 0221055E

 Nato Name: GAINFUL

 Function: AAA

 ELNOT: UN008

| | Leg | Route | Detect | | Altitude | Heading | Velocity |
| Route Name | Num | Pt. # | Status | Location | Elevation (ft) | Range | Terrain Masking Alt |
(deg)		(knots)	Position	(deg) (NM)	(AGL / MSL) ft		
Route ESDP S	5	19	Weapon Lethal	370351N 0220720E	2000.0 AGL		
133.0	480.00	11 o'cloc	-3.6	2.9	0 / 761		

==

End of Route Summary.

APPENDIX B. RADAR PARAMETRIC DATA FOR RADAR TPS-43

Classification: UNCLASSIFIED
Caveat:
Derived from: Classified by
Declassification On: Declass Instructions
Header Version: 1.00
Component Name: TPS-43 EW
Modified By: ILIAS PANAGOPOULOS
Data Source: GR-EW
Last Updated: 20 June 2004   21:45:00 GMT
Comments:
Unclassified (TPS-43) Data and parameters in order to determine its detection range
against a 1 sqm target under clear weather conditions and with stand off jamming. The
jammer parameters are given in another database. The rms sidelobe level is estimated
at 10 dBi for this relative complex antenna system. Note that the system has a frequency
agility that requires 200-MHz jammer bandwidth. Also the radar does not provide
coherent integration that requires the Doppler bandwidth be set to the PRF value.
Data Version: 1.00

Equipment Code: TPS-43EW
Nato Name: EW STACKED BEAM RADAR
ELNOT: Q0058
Function: EW
Antenna Height (meters): 17.00
Minimum Operating Frequency (GHz): 3.000
Maximum Operating Frequency (GHz): 3.200
Minimum Operating PRF (Hz): 250.00
Maximum Operating PRF (Hz): 250.00
Azimuth Beamwidth (deg): 1.10
Backlobe Power: (dB down): 28.90
Minimum Elevation Coverage Angle (deg): -8.40
Maximum Elevation Coverage Angle (deg): 50.00
Pulse Width (usec): 6.50
Effective Noise Bandwidth (Hz): 100.00
Pulse Compression Gain (dB): 4.50
Receiver Loss (dB): 12.00
Calculated One Square Meter Detection Range (Km): 2912.65
Documented One Square Meter Detection Range (Km): 102.00
Maximum Processing Range (Km): 220.00

Beams:
        Beam #1
Pattern: Stacked
Frequency (GHz): 3.000
Elevation Boresight (deg): 6.00
Elevation Beam Width (deg): 2.60
Transmitter Gain (dB): 36.00

Receiver Gain (dB): 40.00
Power (KW): 4000.0000
PRF (Hz): 250.00
Effective Number of Pulses: 20.00
S/N With Integration Case 1 (dB): 2.45
S/N With Integration Case 2 (dB): -0.13
Noise Figure (dB): 4.50
Polarization: Horizontal

Azimuth Side Lobes:
   Azimuth Side Lobe #1
Boresight (deg from main): 2.6
Width (deg): 2.5
Power (dB down): 25.0
Elevation Side Lobes:
  Azimuth Lobe #1
  Boresight (deg from main): 3.3
  Width (deg): 1.6
  Power (dB down): 17.0

APPENDIX C. WEAPON PARAMETRIC DATA

Classification: UNCLASSIFIED
Caveat:
Derived from: Classified by
Declassification On: Declass Instructions
Header Version: 1.00
Component Name: GAINFUL
Modified By: ILIAS PANAGOPOULOS
Data Source: HAF-NPS
Last Updated: 20 Apr 2004   21:01:20 GMT
Comments:
Surface to Air Tactical guided missile
Target Acquisition: Visual/Radar
Missile Guidance: Radio Command / Semi ACTIVE homming
Missile CCM: -
Data Version: 1.10

Equipment Code: GAINFUL
Nato Name: GAINFUL
Label: SA-6
Type: AAA
Minimum AGL Altitude (feet): 90.0
Maximum AGL Altitude (feet): 60000.0
Minimum Effective Range (nm): 2.20
Maximum Effective Range (nm): 16.00
Maximum Kinematic Range (nm): 22.30

Jamming Technique Parametric Data:

Classification: UNCLASSIFIED
Caveat: TEST DATA
Derived from: Classified by
Declassification On: Declass Instructions
Header Version: 1.00
Component Name: ALQ-91
Modified By: ILIAS PANAGOPOULOS
Data Source: NPS
Last Updated: 16 Apr 2004   19:09:26 GMT
Comments:
Jamming Techniques Dta
Data Version: 1.10

Jamming Technique Name: null
Jamming Modes:

        Jamming Mode: NOISE
        Sum Jamming: Yes
  Max Osc. Per Station: 4

        Jamming Mode: COMFUSION
        Sum Jamming: Yes
  Max Osc. Per Station: 4

  Jamming Mode: DECEPTION
        Sum Jamming: Yes
  Max Osc. Per Station: 1

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